

Reguleringsplaner og teknisk forprosjekt

BYBANEN OG HOVEDSYKKELROUTE FRA SENTRUM TIL SANDVIKEN



Reguleringsplan

Planid 71720000

Heritage impact assessment (HIA)

THE WORLD HERITAGE SITE BRYGGEN, BERGEN

Konsekvensutredning for verdensarven (KUVA)

VERDENSARVSTEDET BRYGGEN, BERGEN

RA-B-002

Norconsult 

**Detaljreguleringsplan for Bybanen med hovedsykkelrute fra sentrum til Åsane
delstrekning Kaigaten - Sandviken. Arealplan-ID 71720000 og 71730000**

Heritage Impact Assessment (KUVA)

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Norsk sammendrag

Bakgrunn

Bergen kommune har utarbeidet et detaljreguleringsforslag for Bybanens strekning Kaigaten-Sandviken. Planforslaget innebærer at Bybanen legges i tunnel, i motsetning til den gjeldende regulerte løsningen, hvor bybanetraséen føres over Torget og langs Bryggen.

Parallelt utarbeides det en reguleringsplan for en hovedsykkelrute som skal knytte Bergen sentrum til sykkelveinettet mot Åsane. Selv om dette er to separate reguleringsplaner, er de vurdert samlet med hensyn til deres påvirkning på verdensarvstedet Bryggen.

Utarbeidet av

Denne rapporten er utarbeidet av Norconsult. Fagansvarlig for utredning av verdensarv er Eirik Herdlevær. Rapporten er blitt fagkontrollert av Ole-Magne Nøttveit og Siri Sandtorv Heimark. Alle er ansatt hos Norconsult. Rapporten er utarbeidet på vegne av Bergen kommune. Vi bekrefter at rapporten er utviklet som en uavhengig rapport.

Verdier

Vurderingen er basert på metodikken i M-1941, med enkelte metodiske tilpasninger. Verdiene er gjennomgående høye, noe som gjenspeiler prinsippet i M-1941 om at verdensarveiendommer tillegges svært stor verdi. Vurderingen skiller mellom:

- Attributter knyttet til selve verdensarveiendommen, og
- Støttende attributter, det vil si kulturminner og kulturmiljøer som er knyttet til den hanseatiske virksomheten.

Elementer som er knyttet til denne virksomheten er vurdert å ha svært stor verdi, uavhengig av deres direkte tilknytning til verdensarveiendommen. Det historiske trehusmiljøet innenfor influensområdet er vurdert å ha stor til svært stor verdi.

Påvirkning og konsekvens

De samlede planforslagene for hovedsykkelruten og Bybanen er vurdert å medføre stor negativ konsekvens. Enkelte påvirkninger, som konflikter med middelalderske kulturlag og den middelalderske murstrukturen i Kong Oscars gate og Heggebakken, er vanskelige å unngå som følge av den planlagte linjeføringen og nødvendige infrastrukturtiltak. De øvrige hovedkonfliktene kan oppsummeres som følger:

- Grunnvannsforhold
- Mindre funksjonell barrierevirkning av tosidig sykkelfelt
- Redusert område ved inngangspartiet til Finnegården
- Tap av verdifulle trebygninger i Sandviken

Grunnvannsforhold

Det er utarbeidet en grunnvannsmodell basert på både eksisterende og nye boredata. Dette gir et vesentlig bedre kunnskapsgrunnlag enn ved tidligere vurderinger. For simuleringen med lavest tunnelinnlekkasje viser modellen en potensiell grunnvannssenkning på inntil 10 cm ved Bryggen og inntil 5 cm ved Finnegården. For Vågsbunnen (RA-B-017) viser modellen en mulig grunnvannssenkning på inntil 5 cm. Det må presiseres at disse endringene er endringer i gjennomsnittlig grunnvannsnivå over tid, og at registrerte naturlige grunnvannsnivåvariasjoner over tid er langt større. Det vil derfor være utfordrende og tidkrevende å

dokumentere om tunnelen har medført grunnvannssenkning i denne størrelsesordenen. Det knytter seg fortsatt en viss usikkerhet til beregningene på dette stadiet i planprosessen. Denne usikkerheten bidrar til en større vurdert konsekvens. Punktet må følges opp i det videre arbeidet.

Funksjonelle barrierevirkninger

Etableringen av toveis sykkelvei skaper en mindre funksjonell barriere langs Bryggen, bestående av fire trafikkfelt inkludert trasé for kollektivtransport. Selv om planforslaget reduserer det samlede trafikkarealet, introduserer det samtidig et nytt element med tosidig sykkelfelt. Kantsteiner, selv om de foreslås lavere enn i dag, forsterker barrierevirkningen noe. Besøkende må krysse flere trafikkstrømmer, noe som til en viss grad svekker tilgjengeligheten og lesbarheten av området.

Avstand til Finnegården

Den nye trafikkløsningen flyttes nærmere Finnegården, noe som svekker den romlige sammenhengen med Vågen og reduserer tilgjengelig areal for besøkende og fotgjengere. Dette er vurdert som en negativ påvirkning og har vært et sentralt tema også i tidligere planfaser.

Flytting av verdifulle trebygninger i Sandviken

Den foreslåtte traséen berører tre bygninger i Rosegrenden som risikerer å måtte rives. Som avbøtende tiltak foreslås det at bygningene flyttes innenfor samme område. Trehusbebyggelsen i Bergen utgjør en viktig støttende verdi for verdensarveiendommen. Selv ved relokalisering vil tiltaket innebære en endring av kulturmiljøets integritet.

Oversikt over påvirkning, konsekvensgrad og samlet konsekvens.

Verdi	Attributt	Påvirkning	Konsekvens
Hanseatic Heritage	Existing buildings (tangible)	Forringet	Stor negativ konsekvens (3-)
	Archaeological deposits (tangible)		
Historic townscape and historic trading port	Supporting attribute - Compact medieval urban structures (tangible)	Forringet	Stor negativ konsekvens (3-)
	Supporting attribute - Historic harbour district (tangible)	Noe forringet	Middels negativ konsekvens (2-)
	Supporting attribute – Archaeological deposits (tangible)	Forringet	Stor negativ konsekvens (3-)
Contemporary urban cityscape	The old wharf and 62 buildings of former township (tangible)	Noe forringet	Middels negativ konsekvens (2-)
	Supporting attribute – Historic wooden city (tangible)	Forringet	Middels negativ konsekvens (2-)
	The objective of preserving Bryggen (intangible)	Noe forringet	Middels negativ konsekvens (2-)
Samlet konsekvens			Stor negativ konsekvens

Metodisk diskusjon

Konsekvensutredninger for verdensarv (KUVA/HIA) er en relativt ny metode for vurdering av verdensarv i Norge og krever tilpasning til den enkelte verdensarveiendom og dens kontekst. Definisjonen av verdier, attributter og støttende verdier varierer mellom ulike verdensarvsteder.

I denne vurderingen knytter det seg en metodisk utfordring til begrepet «støttende attributter». I forvaltningsplanen er disse definert som elementer utenfor verdensarveiendommens avgrensning. I andre verdensarvsammenhenger omtales tilsvarende elementer vanligvis som støttende verdier eller oppsluttende verdier. Som eksempel er støttende verdier i verdensarven Rjukan-Notodden industriarv knyttet til attributtene og omfatter fysiske spor som tidligere jernbaneinfrastruktur. Slike elementer har begrenset verdi isolert sett, men høy verdi i kraft av sin sammenheng og tilknytning til verdensarven.

Ved Bryggen har de såkalte «støttende attributtene» ofte svært høy egenverdi uavhengig av deres tilknytning til verdensarveiendommen. Dette bidrar til å viske ut skillet mellom attributtene som bærer den fremragende universelle verdien (OUV) og det omkringliggende kulturmiljøet. Som følge av dette oppstår metodiske utfordringer som kompliserer vurderingen og tolkningen av påvirkninger på verdensarveiendommen. Denne problemstillingen kan ikke fullt ut unngås i en historisk bykontekst som middelalderbyen Bergen, men den kan reduseres gjennom følgende tiltak:

- Tydelig skille mellom attributter som direkte bærer den fremragende universelle verdien (OUV) og omkringliggende/støttende kulturmiljøer.
- Innføring av en todelt vurderingstilnærming.
- Eksplisitt vekting av påvirkninger innenfor og utenfor verdensarveiendommens avgrensning.

Ettersom denne utredningen er utarbeidet som en supplerende vurdering, har det ikke ligget innenfor oppdragets rammer å utvikle konkrete metodiske løsninger for å håndtere denne problemstillingen.

Positive effekter

Det er flere positive sider ved planforslaget. Planforslaget legger opp til en helhetlig oppgradering av det offentlige byrommet, som særlig langs Vågen gir mulighet til å synliggjøre og formidle historiske sammenhenger og bystrukturer gjennom utformingen av gate- og byrom på en måte som ikke oppnås i dag.

Oppgradering av vann- og avløpsinfrastruktur, sammen med annen underjordisk infrastruktur, er fremhevet som et positivt tiltak i Bryggens forvaltningsplan og vurderes generelt som gunstig. Slike oppgraderinger kan også bidra til forbedret håndtering av overvann ved å lede avrenning bort fra sårbare områder. Dette kan redusere infiltrasjon av salter og forurensende stoffer fra bymiljøet til grunnvannssystemet.

Trafikkplan sentrum, som inngår i referansesituasjonen, vil medføre en betydelig reduksjon i trafikkmengdene. Selv om de tilleggsmessige fordelene ved planforslaget fremstår mindre når de vurderes opp mot denne referansesituasjonen, er den samlede utviklingen fortsatt positiv.

En mer helhetlig utforming av gaterommet langs Bryggen vil gi økt areal mellom trafikkarealet og de historiske byggebygningene. Sammen med lavere kantsteiner enn det som er lagt til grunn i referansesituasjonen, vil dette bidra til et mer integrert og visuelt sammenhengende miljø. Planforslaget innebærer også at dagens busskur, bussholdeplasser og taxiholdplasser langs Bryggen fjernes, noe som gir mer plass til besøkende og gående. I tillegg vil belysning av verdensarveiendommen fremheve de historiske bygningene og gi en forbedret visuell opplevelse på kvelds- og nattetid.

Påvirkning på OUV

HIA/KUVA-utredningen vurderer potensielle påvirkninger og konsekvenser for til sammen åtte attributter og støttende attributter, med tilhørende OUV-verdier angitt i fet skrift:

- **Hanseatisk arv (Hanseatic Heritage)**
 - Eksisterende bygninger (Existing buildings)
 - Arkeologiske kulturlag (Archaeological deposits)
- **Historisk bylandskap og historisk handelsby (Historic townscape and historic trading port)**
 - Kompakte middelalderstrukturer (Compact medieval structures (supporting attribute))
 - Historisk havnedistrikt (Historic harbour district (supporting attribute))
 - Arkeologiske kulturlag (Archaeological deposits (supporting attribute))
- **Urbant bylandskap (Contemporary urban cityscape)**

- Den gamle bryggerekken og de 62 bygningene fra det tidligere bysamfunnet (The old wharf and 62 buildings of former township)
- Bergens historiske trehusbebyggelse (Historic wooden city (supporting attribute))
- Målet om å bevare Bryggen (The objective of conserving Bryggen)

Hanseatisk arv (OUV)

Det er vurdert påvirkning på to attributter, **Eksisterende bygninger** (*Existing Buildings*) og **Arkeologiske kulturlag** (*Archaeological Deposits*). Ettersom disse attributtene er nært knyttet til hverandre, er de vurdert samlet.

I henhold til vurderingsmetoden medfører usikkerhet knyttet til grunnvannsforholdene som følge av tiltaket at påvirkningen vurderes som høy. Selve grunnvannsmodellen viser imidlertid kun begrensede endringer i grunnvannsnivået. Usikkerheten knyttet til beregningsresultatene bidrar likevel til å øke vurdert påvirkning og dermed konsekvensgraden.

Tiltaket kan derfor potensielt påvirke verdensarveiendommens fremragende universelle verdi (OUV). Det videre arbeidet bør ha fokus på å styrke kunnskapsgrunnlaget og redusere usikkerheten knyttet til grunnvannsmodellens resultater. Dette vil gi et bedre grunnlag for å dokumentere at tiltaket ikke utgjør en risiko for Bryggens OUV, og særlig ikke for de hanseatiske verdiene.

Historisk bylandskap og historisk handelsby (OUV)

Den hanseatiske virksomheten kommer også til uttrykk gjennom en rekke tilknyttede kulturminner og kulturmiljøer, herunder middelalderbyen Bergen (*Archaeological Deposits*) utenfor verdensarveiendommens avgrensning. Tiltaket vil komme i konflikt med middelalderske kulturlag som følge av infrastrukturarbeider og mulige hydrogeologiske endringer. Flere av gatene som berøres av tiltaket har tidligere vært gjenstand for graving og infrastrukturarbeider i forbindelse med tidligere prosjekter. De dypeste arkeologiske kulturlagene vil derfor kunne unngås. Samtidig forventes reduksjonen i trafikkmengden å gi enkelte positive virkninger og redusere belastningen på kulturlagene.

Rundt om i byen finnes en rekke middelalderske strukturer og romlige sammenhenger som inngår i det støttende attributtet Kompakte middelalderstrukturer (*Compact Medieval Structures*). Kun et begrenset antall av disse vil bli påvirket. En historisk murstruktur i Heggebakken vil imidlertid bli direkte berørt, og tiltaket kan også komme i konflikt med hittil ukjente middelalderske strukturer i gateløpene. Det historiske havnedistriktet (*Historic Harbour District*) ligger i verdensarveiendommens umiddelbare nærområde. Det foreslåtte veganlegget vil bli liggende noe nærmere Finnegården enn i referansesituasjonen, noe som vurderes som en negativ endring sett fra verdensarveiendommens perspektiv.

Samlet sett vurderes påvirkningene på de støttende attributtene ikke å være av en slik karakter at de truer Bryggens fremragende universelle verdi (OUV), og særlig ikke verdiene knyttet til Historisk bylandskap og historisk handelsby (*Historic Townscape and Historic Trading Port*). Tiltaket representerer likevel en negativ utvikling som over tid kan bidra til en byutvikling som i mindre grad understøtter og er i samsvar med Bryggens OUV.

Urbant bylandskap (OUV)

På samme måte som for OUV-verdien Hanseatisk arv, kan usikkerhet knyttet til grunnvannspåvirkning også påvirke OUV-verdien Målet om å bevare Bryggen (*The Objective of Conserving Bryggen*). Det er derfor behov for ytterligere undersøkelser og/eller videreutvikling av grunnvannsmodellen for å etablere et mer robust kunnskapsgrunnlag om grunnvannsforholdene. De beregnede påvirkningene på grunnvannet er i utgangspunktet begrensede, men usikkerheten knyttet til beregningene medfører at vurderingen blir mer konservativ i henhold til den anvendte metodikken. Dette bør følges opp i den videre planleggingen og prosjekteringen.

Bergens historiske trehusbebyggelse (*Historic Wooden City*) utgjør et støttende attributt til verdensarveiendommen. Tre bygninger i Rosegrenden vil bli berørt av tiltaket og må flyttes. Det er foreslått at bygningene relokaliseres innenfor Rosegrenden. Dette er vurdert ikke å påvirke den fremragende universelle verdien (OUV).

Det nye veganlegget vil bli liggende nærmere Finnegården enn i referansesituasjonen. Dette kan påvirke attributtet Bruk og funksjoner (*Use and Functions*) ved å redusere tilgjengelig areal for besøkende og formidling i dette området. Endringen vurderes ikke å medføre en påvirkning på OUV, men representerer likevel en negativ utvikling i verdensarveiendommens omgivelser og forvaltningsmessige kontekst.

Avbøtende tiltak

Det vises til kapittel 5 for en gjennomgang av avbøtende tiltak. For å unngå påvirkninger bør prosjektets omfang og utforming justeres slik at det i større grad tar hensyn til trehusbebyggelsen i Sandviken som en støttende verdi, samt kulturmiljøet foran Bryggen og Finnegården. For å redusere påvirkningene må det tas særskilt hensyn til middelalderse kulturlag ved plassering og omlegging av underjordisk infrastruktur. Det bør også gjennomføres tiltak for å sikre infiltrasjon til grunnvannet, samtidig som eksisterende systemer for håndtering av grunnvann opprettholdes.

Kantsteinhøydene bør reduseres ytterligere for å minimere barrierevirkninger. Det bør også sikres en plan for en helhetlig oppgradering av byrommene langs strekningen, slik at usikkerheten knyttet til denne delen av tiltaket reduseres. For å forbedre dagens situasjon bør utskifting av tilbakefyllingsmasser rundt eksisterende infrastruktur vurderes, forutsatt at det foreligger bedre tekniske løsninger, og at slike tiltak ikke medfører skade på arkeologiske kulturlag.

Pågående prosess

Dette er ikke en endelig rapport. Gjennom hele prosjektets levetid må det arbeides kontinuerlig med å forstå, vurdere og håndtere de påvirkningene de foreslåtte tiltakene kan ha på verdensarveiendommen Bryggen. De problemstillingene og bekymringene som er identifisert i denne rapporten må følges opp og håndteres i de videre plan- og prosjekteringsfasene, frem til en eventuell realisering av tiltaket.

Etter den offentlige høringen og etterfølgende politisk behandling av planforslaget vil det sannsynligvis være nødvendig å revidere og oppdatere vurderingene. En slik gjennomgang bør vurdere om innspill fra høringsprosessen, endringer i prosjektutformingen, oppdatert teknisk dokumentasjon eller vilkår knyttet til vedtaket påvirker konklusjonene i HIA/KUVA-utredningen, herunder vurderingen av mulige påvirkninger på Bryggens fremragende universelle verdi (OUV).

Forvaltningen av verdensarven må derfor sees som en kontinuerlig prosess gjennom hele prosjektforløpet, der ny kunnskap og eventuelle endringer i tiltaket fortløpende innarbeides i vurderingene for å sikre at Bryggens OUV ivaretas på en tilfredsstillende måte.

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1 Proposed action and alternatives

This report assesses the impact on the world heritage property Bryggen in Bergen from two separate zoning plans that are prepared together. These are the plans for light rail from Bergen city centre to Sandviken, and a main cycle lane from the city centre to Sandviken. Throughout the planning and impact assessment process several principles concerning the cultural heritage values have been followed with the intent to minimize the impact on the world heritage property, and the cultural environment.

Key principles during the planning phase have been:

- Focus on the World Heritage property Bryggen, its values, attributes and its supporting values.
- The avoidance of physical and visual barriers by focusing on important sight axes on Torgst, Bryggen and Nedre Torgallmenning.
- The need for space around Bryggen and Finnegården used for historical dissemination.
- Highlight the connection between the Bryggen houses and the harbour.
- Highlight historical connections to a largest degree possible
- Focus on groundwater, primarily avoiding changes in groundwater levels, but also securing buildings and cultural layers in the ground if the groundwater level changes.
- Limit impact on protected archaeological remains during groundwork and the reorganization of various infrastructure
- To avoid impact on protected buildings.
- Avoid vibrations that can cause harm to both archaeological remains and fragile buildings and structures.
- Terrain changes may cause impact on cultural heritage and environments

The cultural heritage values within the zoning plan area and the area of influence are high, both above and below ground-level. The highest value is connected to the World Heritage site Bryggen, but there are also significant values in both the city centre and Sandviken. A lot of the cultural monuments are also connected to the World Heritage site as supporting values and many of the city's historical development during its long history is interconnected.

1.1.1 Description of the proposed action and the two zoning plans

The figure below illustrates the differences in the alignments of the Bergen Light Rail (Bybanen) and the primary cycle route between the zoning plans adopted in 2023 and the planning proposals currently being presented. Along the section from Kaigaten to Amalie Skrams vei/Munkebotn, the alignments approved under the 2023 plans will be superseded by the alignments proposed in the current plans. Farther north, the alignments for both the Bergen Light Rail and the primary cycle route will remain as approved in the 2023 zoning plan. An explanation of the differences between the plans is provided in the following chapters.

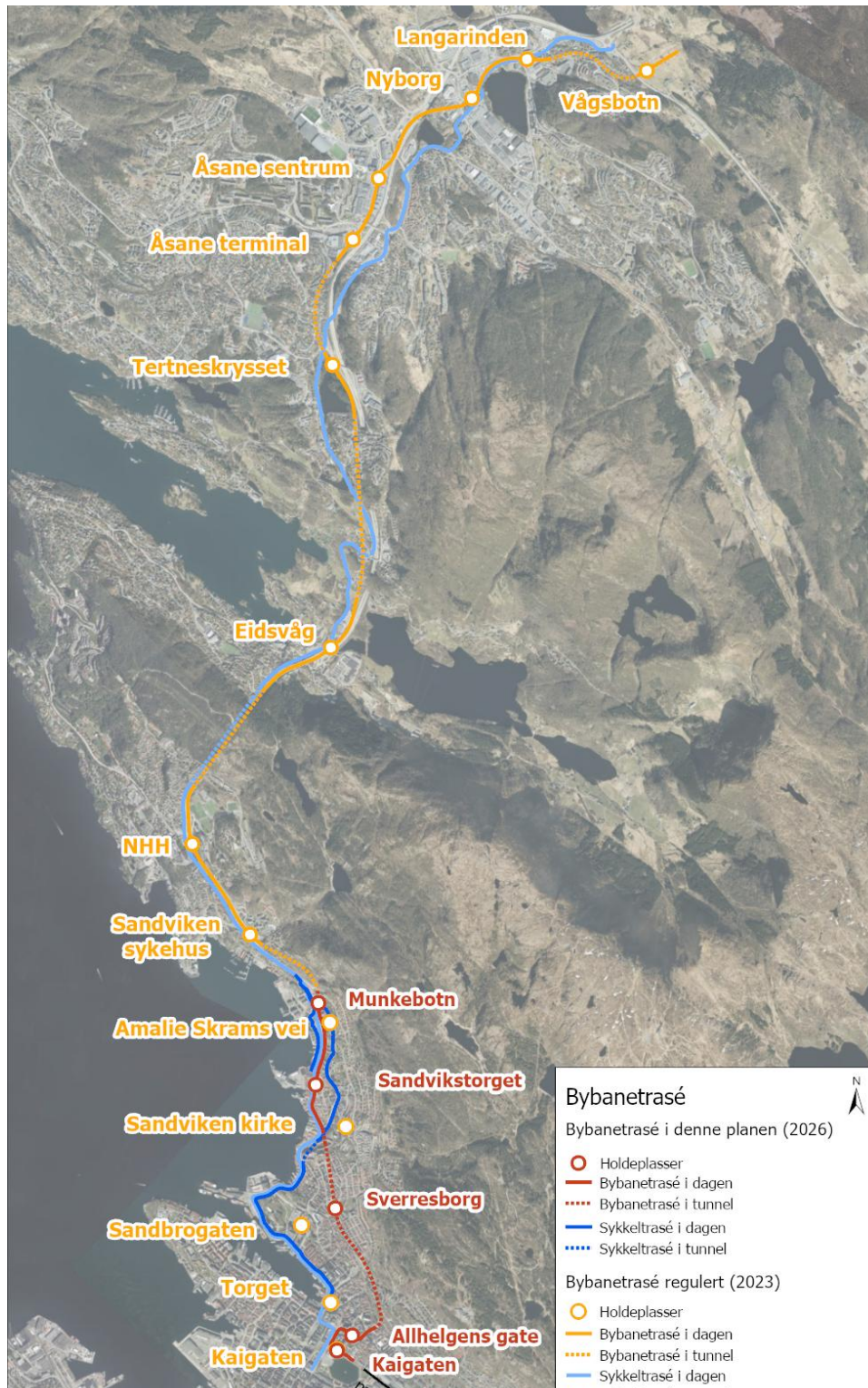
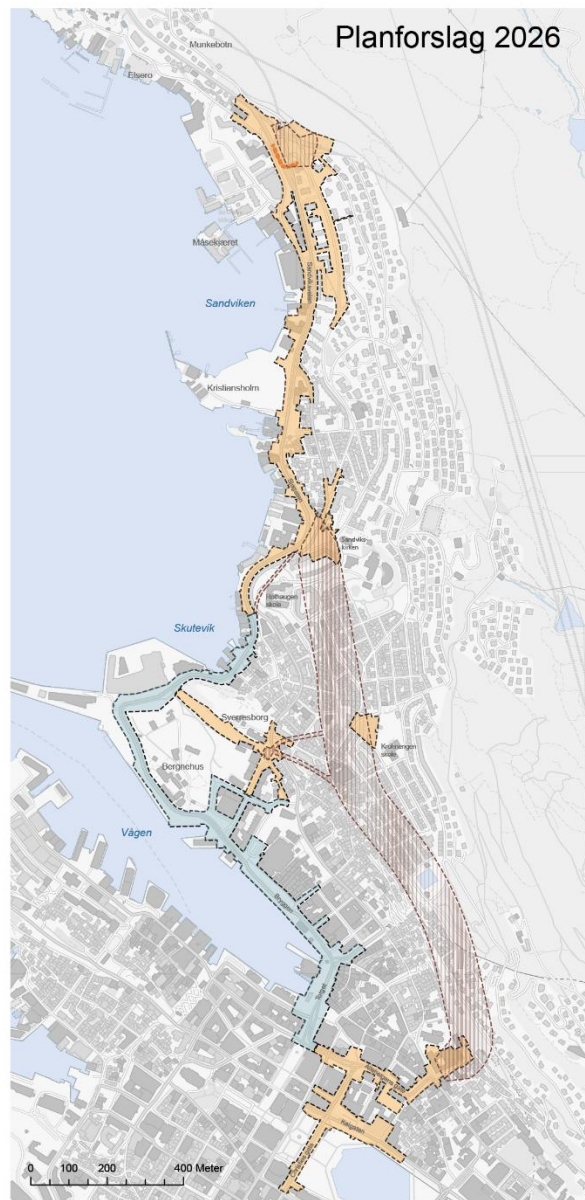
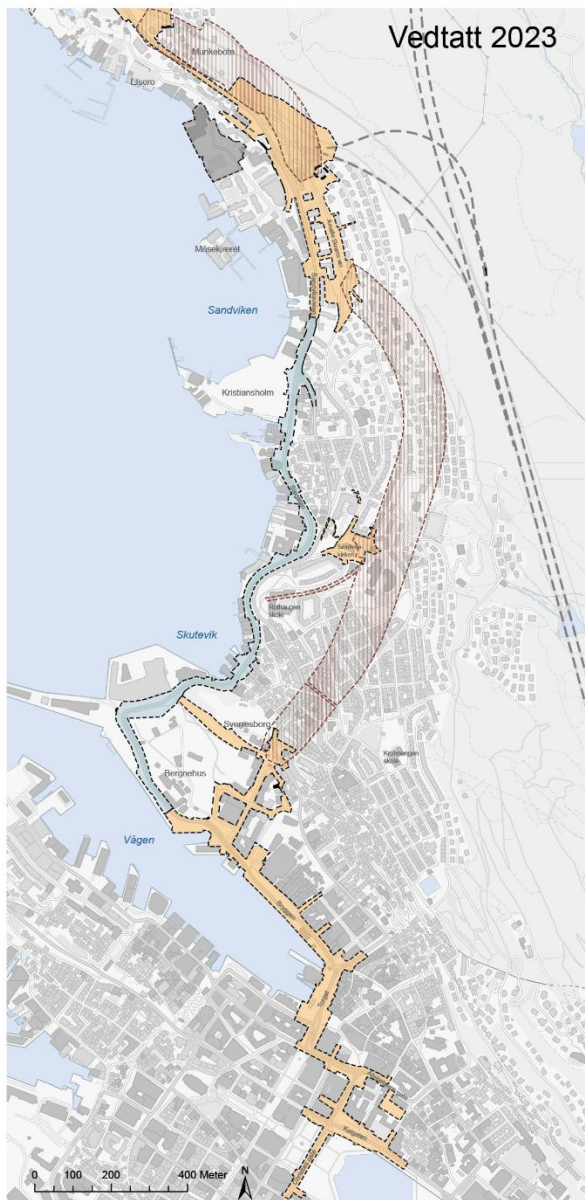


Figure 1-1: This zoning plan designates the red alignment for the Bergen Light Rail (Bybanen) and the dark blue alignment for the primary cycle route. These alignments will replace those approved under the 2023 zoning plan.



-  Vertikalnivå 1
-  Vertikalnivå 2 (bybane)
-  Vertikalnivå 2 (sykkel)
-  Vertikalnivå 2 (riggområde)
-  Vertikalnivå 3

Figure 1-2: Boundaries of the zoning plans currently in force for BT5 (left) and the boundaries of the proposed planning area (right).

In addition to the Bergen Light Rail (Bybanen) alignment and the primary cycle route, the zoning plans include areas required for the realignment of road infrastructure, adjacent areas for landscaping and public space improvements associated with the stops and the primary cycle route, as well as temporary construction areas.

The plan boundary differs somewhat from that presented during the notification of the commencement of the planning process. The planning area is considerably smaller than the originally notified area, although several minor extensions have also been made at specific locations.

It should also be noted that sections of Christies gate and Småstrandgaten, which were included in the primary cycle route proposal when the planning process was initiated, are now incorporated into the planning proposal for the Bergen Light Rail between Kaigaten and Sandviken.

Figure 1-2 illustrates the differences between the boundaries of the zoning plans currently in force for the Bergen Light Rail to Åsane and the boundaries of the new zoning plans. In some locations, areas covered by the existing zoning plans are not overlapped by the proposed plans. Should the revised planning proposals be adopted, it is intended that separate procedures will be initiated to revoke those parts of the existing zoning plans that are not covered by the new plans and are therefore no longer required.

1.1.2 Light rail alignment (Bybanen)

The Bergen Light Rail (Bybanen) alignment between Kaigaten and Sandviken is planned partly in tunnel and partly on surface. Stops are proposed at:

- Kaigaten
- Allehelgens gate
- Sverresborg (underground)
- Sandvikstorget
- Munkebotn

The Bergen Light Rail (Bybanen) is proposed to extend from the stop at Kaigaten along an approximately 450 m at-grade section via Christies gate, Allehelgens gate, and Nygaten to the tunnel portal at Heggebakken. Along this section, a stop is proposed in Allehelgens gate, which would help relieve passenger demand at the Kaigaten stop for journeys to and from the northern parts of the city.

From Heggebakken, the light rail is proposed to enter an approximately 1,500 m long tunnel extending to Sjøgaten at Slaktehustomten. Approximately 930 m from the tunnel portal at Heggebakken, an underground station is proposed at Sverresborg, with access points located both in Sandbrogaten/Øvre Sandviksvei and adjacent to the Fredens Bolig park. The alignment is then proposed to continue at grade along Sjøgaten/Sandviksveien for approximately 900 m. Two stops are proposed along this section, at Sandvikstorget and Munkebotn. From Munkebotn, the line is proposed to continue in tunnel towards the stop at Sandviken Hospital. This tunnel section and the stop at Sandviken Hospital remain unchanged and are retained in accordance with the approved plan for parts of DS2.



Figure 1-3: Proposed new Bergen Light Rail (Bybanen) alignment between Kaigaten and Sandviken Hospital.

Figure 1-4 illustrates the changes to the Bergen Light Rail (Bybanen) alignment and stop locations compared with the approved zoning plan currently in force.

Under the current plan, the Bergen Light Rail runs at grade from the stop at Kaigaten, via Torget and Bryggen, to the tunnel portal at Sandbrogaten. Stops are provided at Torget and Sandbrogaten. From there, the alignment continues in tunnel to Amalie Skrams vei, including an underground station at Sandvikskirken and an at-grade stop at Amalie Skrams vei.



Figure 1-4: Comparison of the Bergen Light Rail (Bybanen) alignment and stop locations between the approved zoning plan currently in force (orange) and the proposed plan (red).

1.1.3 Primary cycle route

In the proposed plans, the primary cycle northwards from the city centre begins at Torget. From the intersection of Rasmus Meyers allé and Christies gate, no dedicated cycling facility is proposed. Instead, the scheme envisages that cyclists will disperse and make flexible use of the surrounding street network, pavements, and public squares. Cycle lanes are proposed from Torget to Bradbenken, continuing northwards as a segregated cycle track with adjacent footway along Festringskaiaen and Sjøgaten to the existing cycle tunnel beneath Nye Sandviksveien at Rothaugen School in Sandviken. This section is being progressed through a separate zoning plan.

The existing cycle tunnel is proposed to be converted into a segregated cycle track with adjacent footway. From the northern end of the tunnel, a ramp accommodating a cycle track with footway is proposed, providing access to Nye Sandviksveien near Sandviken Fire Station. Within Nye Sandviksveien, Ekregaten, and parts of Amalie Skrams vei, cycling will take place in mixed traffic. From the junction with Formannns vei, Amalie Skrams vei is designated as a shared pedestrian and cycle path. At the northern end of the scheme, a section of cycle track with adjacent footway is proposed, connecting to the pedestrian and cycle bridge at Munkebotn. At this point, the route joins the primary cycle route as approved under the existing zoning plans for the Bergen Light Rail.

A local cycling network is also proposed from the BAS site at Sandvikstorget 64. This includes a cycle-priority access street running parallel to Sandviksveien as far as the Gjensidigegården. From the Gjensidigegården, a cycle track with adjacent footway is proposed along the municipal section of Sandviksveien, connecting with the primary cycle route as proposed in the current plans.

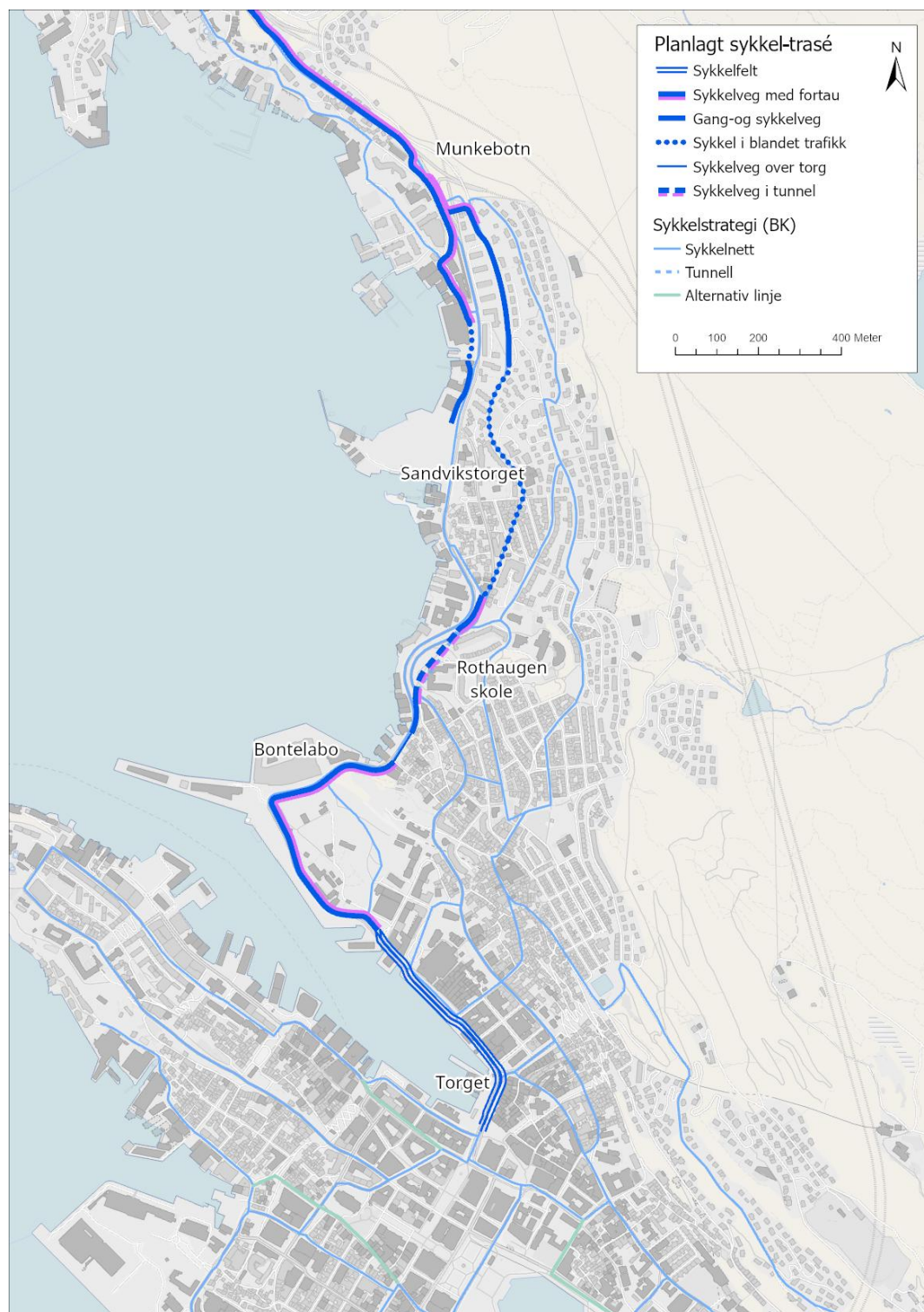


Figure 1-5: Proposed new alignment for the primary cycle route. The figure also shows the proposed local cycling route in western Sandviken, and the strategic lines from the cycling strategy from Bergen kommune.

Figure 1-6 illustrates the changes to the alignment of the primary cycle route in relation to the current plan.

In the current zoning plans, the primary cycle route connects to an existing cycle route from the south that terminates at Rasmus Meyers allé. A cycle track is designated from the junction with Rasmus Meyers allé through Christies gate to the junction with Allehelgens gate. From there, the primary cycle route continues as cycle lanes through the city centre and inner Sandviken. Along the Bergen Light Rail stop at Torget, the plan includes a street where northbound cyclists are given priority. North of Sandvikstorget, at the junction of Sjøgaten and Sandviksveien, the plan shows a transition to a cycle track with an adjacent footway.



Figure 1-6: Comparison of the primary cycle route proposed in the current planning proposal (dark blue) and the route approved under the existing zoning plan (light blue).

1.2 Rejected alternatives during the process

According to the scope of the project from the City of Bergen, Norconsult is to prepare a cycle plan and a light rail plan. Several alternatives have been discussed regarding both zoning plans. The planning process has been iterative. Different measures have been processed through four different phases. The first phase is the public start-up notice stating that a zoning plan process is starting. During the second phase, different alternatives and proposals went through assessment and analysis and recommendations for further planning were presented to the City. The recommendation reports were part of phase three. Phase four concerns the production of the zoning plan documents as well as assessment of proposed action, as well as a technical preliminary project. In the following the main principles that were discussed during phase two and three will be presented and focus on the solutions that got rejected that can impact the World Heritage site. Rejected and recommended alternatives are discussed briefly below.

1.2.1 Cycle plan

The **Cycling Strategy for Bergen 2019-2030** states that local conditions and traffic objectives form the basis for determining the appropriate cycling infrastructure. The strategy does not differentiate between primary cycling routes and district-level cycling routes. The **Norwegian Public Roads Administration's** guidance document **N-V122:2023** identifies cycle lanes and cycling in mixed traffic as the most common solutions in urban environments. Dedicated facilities, such as cycle tracks and shared pedestrian and cycle paths, are identified as the preferred options outside built-up areas and through parks and green corridors. **N100:2025** recommends the use of cycle lanes as part of the primary urban cycling network. The **City of Bergen** is currently developing a *Bergen Standard for Road and Street Design*, which will provide specific recommendations for different street typologies.

The route through the city centre comprises a sequence of urban spaces with distinct characteristics, functions, and varying levels of complexity. Consequently, alternative solutions for the cycle route have been assessed individually for each urban space:

- Småstrandgaten and lower parts of Torgallmenningen
- Torget
- Bryggen
- Dreggen and Bradbenken
- Skuteviken

Three alternative cycling infrastructure principles have been evaluated:

Design principle A: cycling in mixed traffic

Design principle B: cycle lanes

Design principle C: cycle track

Each of these three cycling infrastructure principles offers both advantages and disadvantages. Based on the following key considerations, an initial screening of the alternatives has been undertaken for each urban space:

- Pedestrian
- Urban space quality
- Perceived safety for vulnerable road users
- Road safety
- Continuity and coherence of the cycling network

Design principle C, consisting of a dedicated cycle track operating at grade with pedestrian areas on both the western and eastern sides of the roadway across Torget, has consistently been assessed as achieving the project objectives less effectively than the other alternatives along the entire route. It performs poorly against the criteria relating to pedestrians, urban space quality, and perceived safety. Consequently, this principle was screened out from further consideration.

Design development during the concept design phase

Following the initial screening process, further design development was undertaken. The objective was to develop a solution framework capable of balancing a wide range of requirements within a highly complex and heavily used urban environment. The cycling solutions identified for each urban space were subsequently combined into two continuous route alternatives covering the entire corridor between Torgallmenningen and Festningskaiaen:

Alternative 1: Centrally aligned cycle track combined with cycling in mixed traffic, see figure 1-7.

Alternative 2: Continuous solution with cycle lanes on both sides of the street, see figure 1-8.

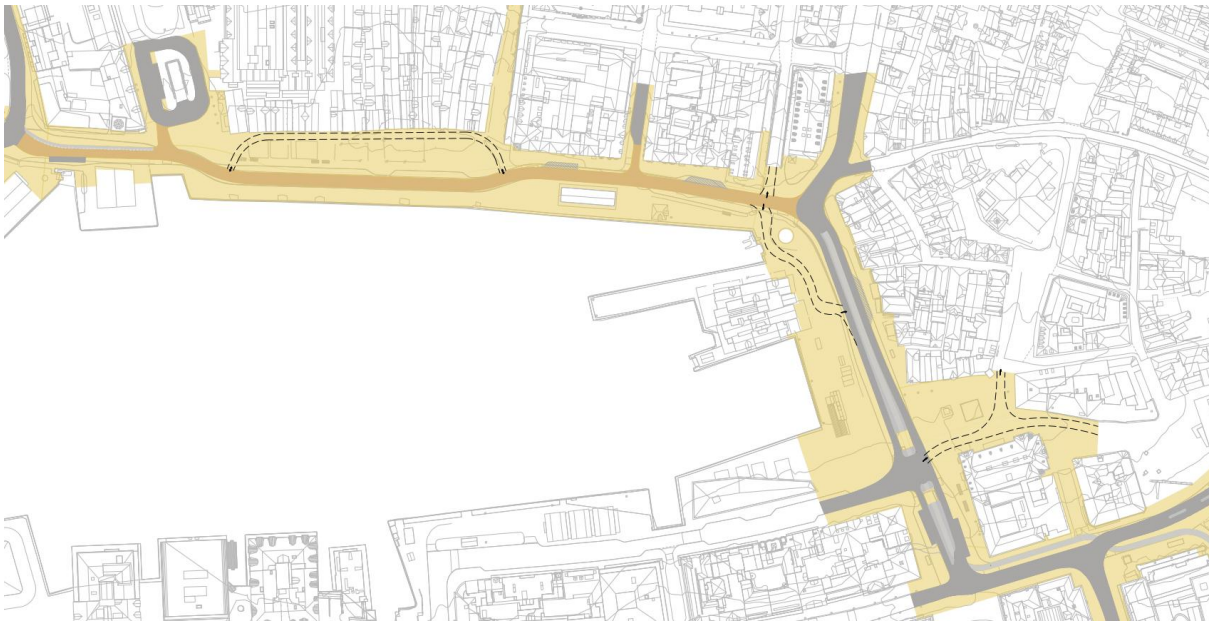


Figure 1-7: Centrally aligned cycle track combined with cycling in mixed traffic

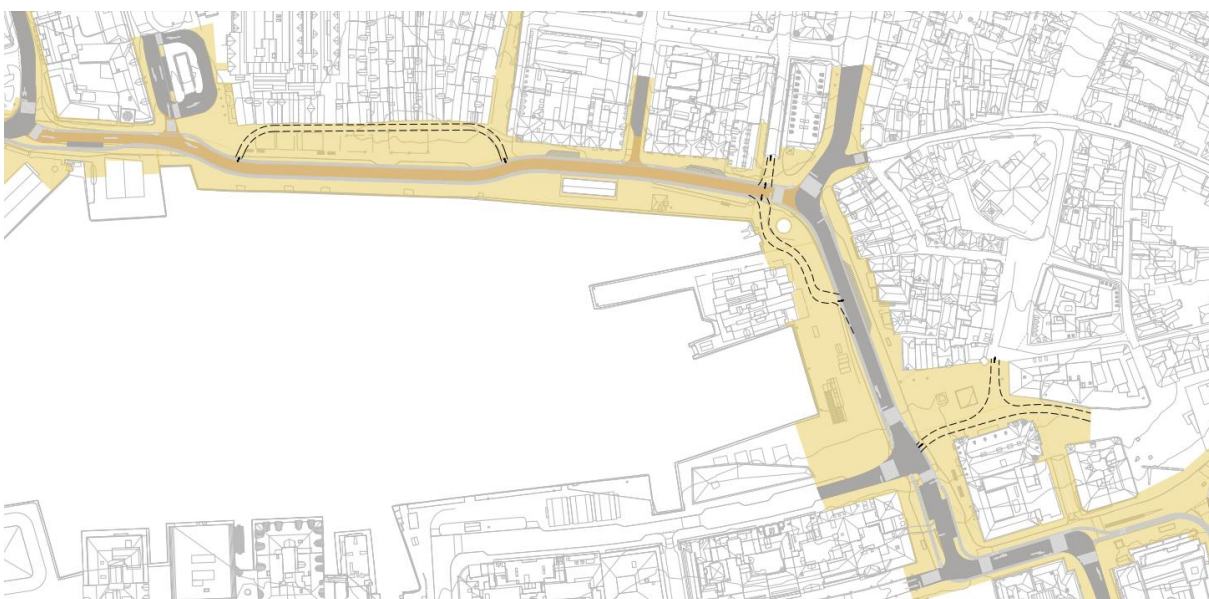


Figure 1-8: Alternative 2: Continuous Solution with Cycle Lanes on Both Sides of the Street.

Alternative 1 Centrally aligned cycle track combined with cycling in mixed traffic

Centrally aligned cycle tracks are not widely used in Norway but have been implemented in various forms elsewhere in Europe. The rationale for introducing this solution within the urban spaces of **Lower Torgallmenningen** and **Torget** was to improve traffic safety and route continuity for cyclists. Intersections, loading and servicing activities, and bus stops are concentrated along the street edges, and one means of reducing frequent interruptions and conflict points for cyclists is to locate the cycle facility within a continuous central alignment. This arrangement primarily interacts with road junctions and is less affected by loading activities and bus stop operations.

The centrally aligned cycle track across **Torget** was combined with cycling in mixed traffic along **Bryggen**. Owing to its limited spatial requirements within the street cross-section, this alternative achieved the highest performance in terms of urban space integration and consideration for the World Heritage property and its setting. Under conditions of low vehicle speeds and limited traffic volumes, the solution was assessed as providing an acceptable level of traffic safety. However, cycling in mixed traffic may still be perceived as unsafe by some cyclists, particularly in environments with a high proportion of bus traffic.



Figure 1-9: Bryggen, cycle in mixed traffic.

Recommendations regarding World Heritage (Alternative 1):

The situation outside Finnegården is largely the same as the current solution but provides somewhat less traffic area towards the Round Tower and provides more space for pedestrians here. A solution with less traffic than the current one within the traffic area will nevertheless be able to provide a better solution for pedestrians and visitors at Finnegården. For Torget in general, the solution will not provide a barrier effect for important sight lines and visual connections from Bryggesporden and Vågsallmenningen.

In the case of Bryggen, a solution with mixed traffic will require a limited area for traffic. A limited traffic area will to a greater extent than the current solution offer a better solution for visitors and pedestrians, as well as the opportunity for dissemination of the World Heritage Site. With a smaller area for buses and cycles than the current solution, the barrier effect towards Vågen will be reduced to a certain extent. Less area for traffic will provide better opportunities for the design and dissemination of important transverse connections, old quaysides and the like. The solution will have a maximum of 4 cm curbside, which will not be perceived as a barrier effect compared to the current situation.

It is assumed that buses and taxis in a mixed solution will have to adjust their speed due to cyclists, while cyclists will be able to maintain a higher speed in light traffic. Arrangements will be made to use both Bryggen and Øvregaten for bus transport, which can spread traffic. The solution is not intrusive and facilitates a traffic-free area at some point in the future, if traffic conditions allow such a solution. Alternative 1 is therefore a better solution for the World Heritage Site Bryggen than Alternative 2.

The design of the pavement, curb-wise, traffic volume and traffic elements may have an impact on the assessment through the next phase and in the final KUVA report.

Alternative 2 Continuous solution with cycle lanes on both sides of the street

Cycle lanes (see figure 1-10) are a familiar and frequently preferred form of cycling infrastructure in urban streets. Cyclists travel alongside motor vehicle traffic, and the arrangement is generally intuitive for both cyclists and drivers. In streets with high traffic volumes, the separation of user groups, including pedestrians, cyclists, and motor vehicles, can enhance the perceived safety of vulnerable road users.

Cycle lane arrangements adjacent to bus stops can be designed either by introducing a break in the cycle lane at curbside stops or by routing the cycle lane behind the passenger waiting area. For this alternative, it has been assumed that the cycle lanes are routed through the side areas behind the bus stops, thereby providing a continuous cycle lane connection from Torget to Festningskaiaen.



Figure 1-10: Continuous solution with cycle lanes on both sides of the street.

Recommendations regarding World Heritage (Alternative 2):

The cycle lane will be introduced on both sides of the road and may provide somewhat less opportunity for dissemination of the World Heritage Site for visitors and groups at Finnegården. Compared to the current situation, the situation can still be improved, although the cycle lane will have a certain barrier effect for pedestrians, compared to a mixed solution and the current situation.

Along Bryggen, a solution with cycle lanes could provide less space for marking historic connection lines as it takes up somewhat more space than a mixed solution with bus and cycle. Cycle lanes provide a greater crossing distance, which will be negative for pedestrians and tourist groups at Bryggen.

It is assumed that the solution facilitates higher speeds for buses and higher speeds for cyclists regardless of other traffic volumes. The solution calls for a traffic-free Bryggen sometime in the future, but this must also apply to the removal of cycle lanes.

Alternative 2 is a somewhat inferior solution for the World Heritage Site Bryggen than Alternative 1. Alternative 2 is nevertheless better than the current solution and will be somewhat like the current regulated solution.

The design of the pavement, curbs, traffic volume and traffic elements can have an impact on the assessment through the next phase and in the KUVA report.

Discussion

In the assessment of alternatives, Alternative 1 (Centrally aligned cycle track combined with cycling in mixed traffic) and Alternative 2 (Continuous solution with cycle lanes on both sides of the street) were evaluated against considerations relating to the Bryggen World Heritage property. The mixed traffic alternative was recommended by the HIA consultant (Norconsult) on the basis that it would minimise the space required for traffic functions and make a larger area available for visitors, interpretation, and public use. The reduction of traffic space would also reduce the functional barrier effect created by the more extensive traffic infrastructure present today.

Under this alternative, public transport vehicles would be required to operate at lower speeds in consideration of cyclists, while traffic movements could be distributed between Øvregeaten and Bryggen. From a broader perspective, the solution also had the potential to encourage a reduction in the number of buses operating past the World Heritage property, as greater consideration would need to be given to cycling conditions.

The City of Bergen chose Alternative 2 for further design development and planning. This was decided due to uncertainties regarding traffic volumes with several bus routes, an unknown number of tourist buses, taxis and deliveries, the need for an alternative route when the Fløyfjellstunnel is temporarily closed, and a general concern regarding large crowds in the area and public safety. The alternative 1 was also not supported by the partners in Miljøløftet.

1.2.2 Light rail plan City Centre + tunnel and turning arrangement

Stop arrangements in the proposed plan

The zoning plan provides for the establishment of at-grade stops at Kaigaten, Allehelgens gate, Sandvikstorget, and Munkebotn. In addition, an underground station beneath Sverresborg is proposed.

The stop at Munkebotn was not included in the resolution adopted by the City Council but was introduced during the course of the planning process. The stops have not yet been assigned official names. The designations used in this section are intended solely to indicate their geographical location.

Kaigaten

The Kaigaten stop represents a natural extension of the existing Line 2 light rail stop. The available space provides sufficient capacity to accommodate a central interchange stop serving both Bergen Light Rail lines. The stop can be designed as a straightforward arrangement with two platforms, creating a legible and intuitive environment for passengers.

Although the Kaigaten stop is located somewhat farther from the bus stops along Olav Kyrres gate, its location has been assessed as providing good accessibility to the principal destinations within the city centre. The stop is situated within a spacious urban setting, and the proposed plan ensures high-quality pedestrian connections in all directions. This is a critical characteristic for what is intended to become the most centrally located and strategically important stop within the Bergen Light Rail network.

Allehelgens gate

Assessments and modelling analyses indicate that providing only a single light rail stop in the most central part of Bergen city centre, at Kaigaten, could result in an insufficient distribution of public transport accessibility, an unnecessary concentration of passenger flows, and suboptimal access to destinations such as Torget, Bryggen, and Vågsbunnen. Establishing an additional stop at Allehelgens gate addresses these challenges without materially affecting overall journey times.

Experience from comparable public transport systems suggests that high passenger volumes and the concentration of travellers at a single stop can increase dwell times at platforms. Model calculations indicate that a stop at Allehelgens gate could reduce passenger demand at Kaigaten by approximately one-third, thereby improving the distribution of passenger flows and enhancing the overall efficiency and accessibility of the light rail network.

Sverresborg - Underground

The location of the underground station at Sverresborg has primarily been determined through an assessment of the relationship between acceptable walking distances from urban areas that the station is intended to serve and the technical requirements of the project, including adequate rock cover and other engineering constraints. These considerations were evaluated on the basis that the tunnel alignment would be constructed between the defined portal locations. All alternatives considered were located within the area identified in the project brief and were based on a preliminary assessment undertaken by Bybanen Utbygging (see figure 1-11).

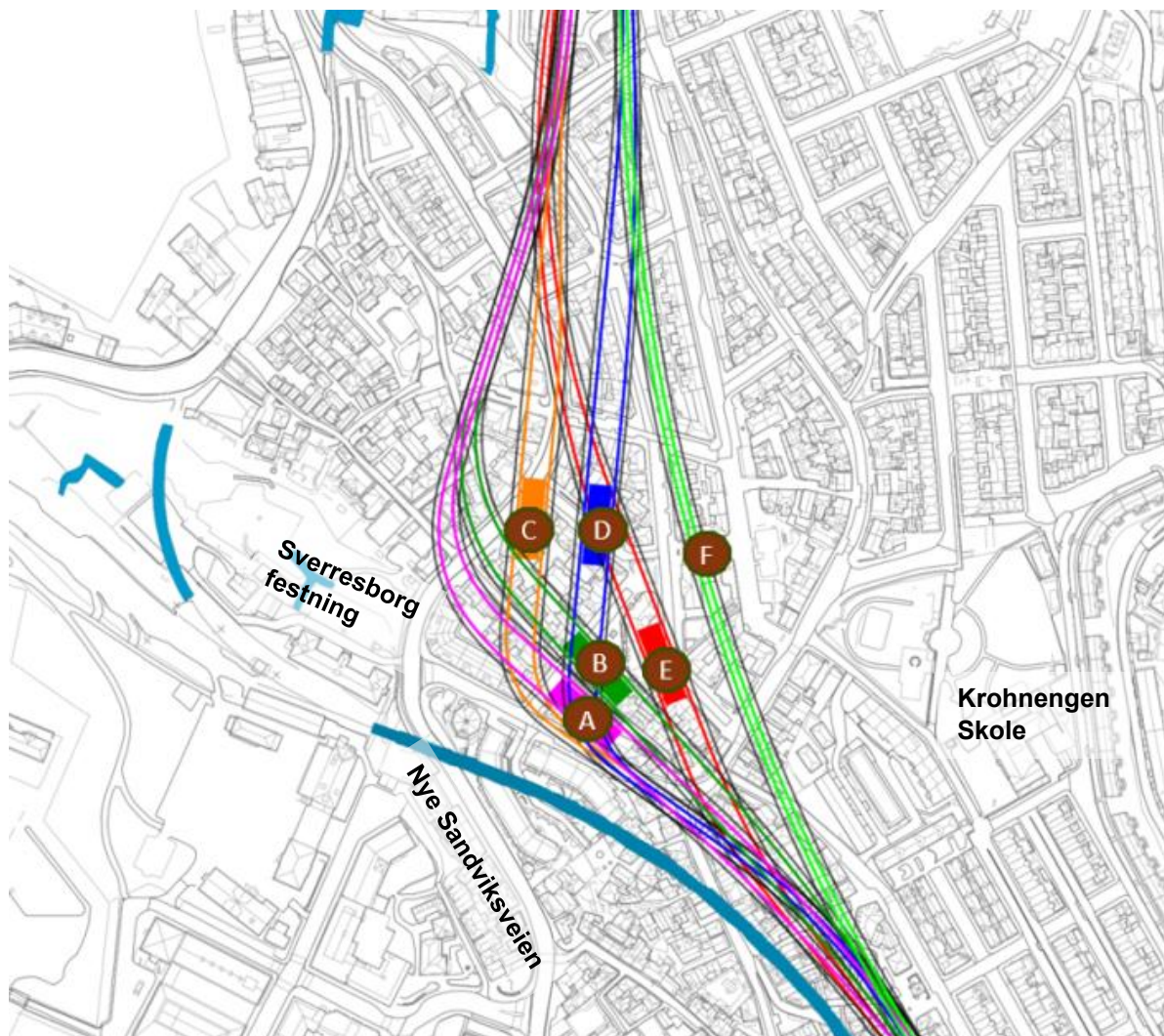


Figure 1-11: Alternative Tunnel and Station Locations. Source: Bybanen Utbygging.

Building on Alternative E, the solution now proposed in the zoning plan was developed with a number of refinements to the access tunnels and the technical design of the station. In addition, facilities enabling the reversal of light rail vehicles arriving from the south have been incorporated into the design concept.

Sandvikstorget

The decision to establish a Bergen Light Rail stop at Sandvikstorget has been subject to little controversy throughout the planning of the light rail extension towards Åsane. Sandvikstorget is a central and spacious urban space with strong urban qualities and good connections to the surrounding neighbourhood. The urban development envisaged under the zoning plans for Kristiansholm has significantly increased the demand for a stop in this area.

The plan provides for a comprehensive upgrade of Sandvikstorget in conjunction with the construction of the light rail system. Particular emphasis has been placed on the objectives of the Kristiansholm Area Zoning Plan, including reducing the barrier effect of Sjøgaten and creating an extension of Søndre allmenning. At present, Sandvikstorget is dominated by surface parking and lacks a coherent urban character.

While there has been broad agreement that a stop should be established at Sandvikstorget, various alternative locations within the area have been considered through an interdisciplinary planning process, with particular attention given to urban design considerations and impacts on the historic urban environment.

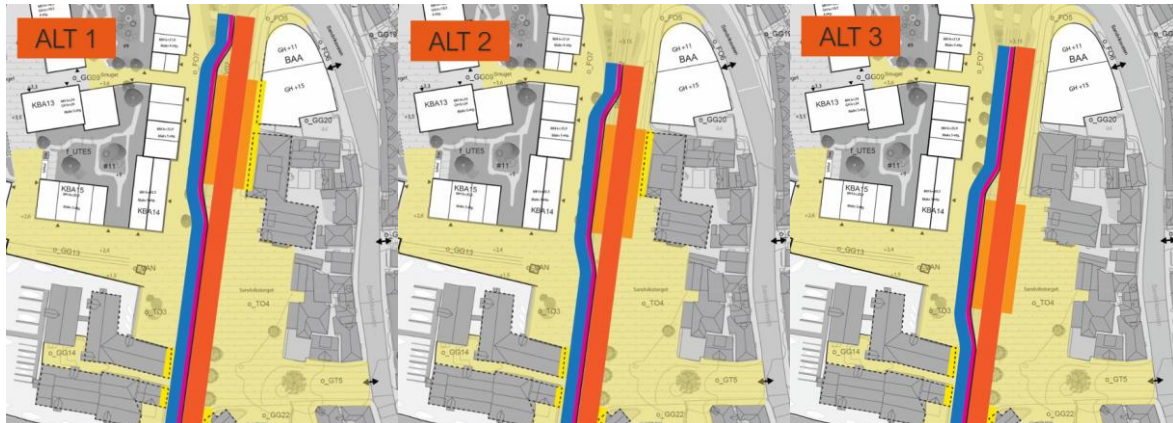


Figure 1-12: Alternative locations for the Sandvikstorget stop considered during Phase 3. The orange line represents the Bergen Light Rail alignment, with the light orange areas indicating the platform locations. The blue line illustrates the roadway alignment along Sjøgaten.

Alternatives 1 and 2 in figure 1-12 exhibit the lowest levels of impact on the historic environment. However, they also achieve lower performance in terms of urban space quality, urban vitality, and public transport functionality, owing to their less central locations within Sandvikstorget. Consequently, a solution broadly corresponding to Alternative 3 in figure 1-12 was, for a considerable period, the preferred option during Phase 3.

Subsequent optimisation of the Kristiansholm junction and the surrounding area demonstrated a need for more extensive intervention in the existing building fabric north of Sandvikstorget. As a result, a more northerly location for the stop, broadly corresponding to Alternative 2 in the same figure, was adopted as the basis for the zoning plan.

With the opening up of this area and the ability to accommodate the stop within a generous urban space, greater weight could be given to the conservation of cultural heritage values. Under this solution, Sandvikstorget would function as an open public square without a stop occupying the square itself, thereby reducing visual barriers towards the waterfront and avoiding other associated adverse effects.

1.2.3 Entrances and Exits to the Underground Station

During Phase 3, extensive assessments were undertaken regarding the location of the two access points to the underground station at Sverresborg.

It was determined that providing one access tunnel in each direction, extending approximately perpendicular to the station, would allow for two fully functional public access points serving different catchment areas and thereby maximise accessibility within the constraints imposed by the tunnel alignment and station location. A lower entrance would serve Skuteviken, Dreggen, and areas extending towards Vågen and the city centre, while an upper entrance would provide access to the hillside districts of Sandviken, Støletorget, and Krohnengen.

During the concept design phase (see figure 1-13), seven alternatives for the lower access point and twelve alternatives for the upper access point were evaluated. Alternatives presenting clear technical challenges, substantial adverse impacts on the historic environment and urban setting, or locations in close proximity to one another were screened out at an early stage of the assessment process.

Following this initial screening, the number of alternatives was reduced to three options for the lower access point and seven options for the upper access point for further evaluation and design development.



Figure 1-13: Overview map of all access point alternatives considered during the concept design phase.

The Sandbrogaten access point (Alternatives 11 and 9 in figure 1-13) was selected because it is the only option capable of serving two distinct areas through a single entrance. The entrance is accessible from both Nye Sandviksveien and Sandbrogaten, thereby extending its catchment area and improving accessibility. In addition, this solution falls within an area already designated for the Bergen Light Rail project under the zoning plan for BT5, adopted in 2022. Consequently, many of the planning considerations and approvals established through the previous zoning process remain applicable to this location.

The alternative access points were considered less favourable because they were either less well located in relation to the principal destinations served by the station, situated too far from the station itself, or would require disproportionately extensive intervention affecting private property.

The assessment of alternatives for the upper entrance to the underground station was undertaken on the basis of the selected lower entrance solution, with the objective of achieving the widest possible overall service coverage for the station. Physical interventions within this part of the city present significant

challenges due to the sensitivity of its cultural heritage values, urban character, and residential environment. Many of the alternatives would have required the demolition of residential buildings or other structures or were directed towards areas that serve important local community functions, particularly for children and young people.

The preferred solution at Fredens Bolig was recommended because of its central location within a busy area characterised by high pedestrian activity. The entrance would be highly visible and integrated into the surrounding streetscape. The principal disadvantage of the option is that it would occupy part of an important green space with recognised cultural heritage significance. However, as further design development demonstrated that the above-ground land requirements could be kept relatively limited, while preserving key functions such as the ball field and other recreational uses, this alternative emerged as the clearly preferred solution.

The selected entrance locations also provide significant construction and engineering advantages due to their spatial relationship with one another and to the underground station itself.

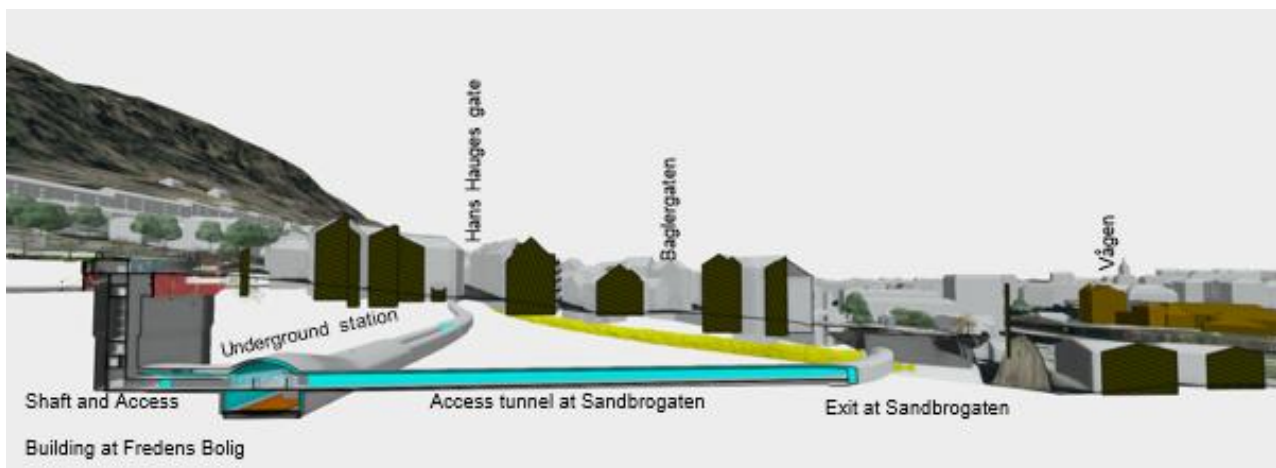


Figure 1-14: Cross-section of the 3D model illustrating the tunnel, access tunnels, and station entrances beneath the urban landscape.

1.2.1 Operational turnarounds from the south

A wide range of alternative solutions for operational turnarounds from the south have been evaluated in phase 3 of the planning process. Most of these were quickly dismissed, either because they were not deemed technically feasible, or because their negative impacts were so extensive that they were considered unrealistic.

The core principle for the operational turnaround proved decisive for the design of the associated transport system, urban spaces, and adaptations to the cultural and local environment. At the same time, the alternatives' impacts on these aspects were heavily weighted in the evaluation. Consequently, the assessment of the various turnaround solutions was an evaluation of different alternatives for the overall spatial planning concept in the city centre.

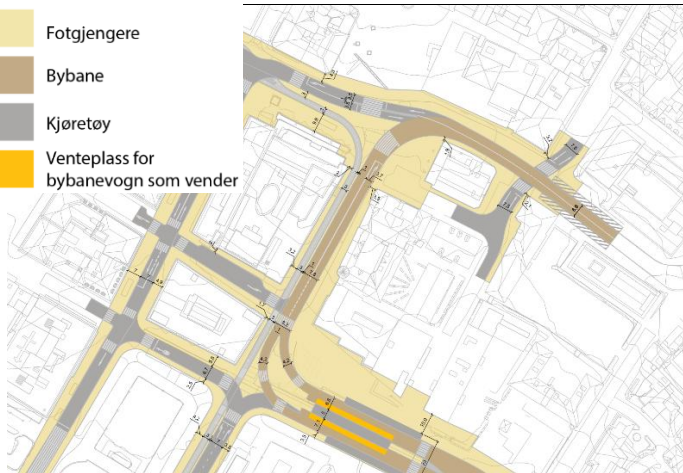
The surface alternatives evaluated in the city centre feature turnback arrangements in either Kaigaten, Starvhusgaten, or Småstrandgaten, cf. Table 1-1. Several different variations within these three turnaround solutions were assessed (see text box); however, this planning description only addresses the main alternatives, along with the key arguments for the selected solution.

In the current zoning plan from 2022, a turnaround arrangement associated with a new stop in Christian Michelsens gate was considered the best solution should a need for a turnaround in the city centre arise. However, as this solution would require a substantial amount of additional track in a demanding urban area, and places excessive constraints on the choice of solution for the Light Rail from the city centre towards Laksevåg and Bergen West, it has not been included in this zoning plan.

Impacts, costs, and goal achievement have been assessed as the basis for selecting the turnaround solution in the city centre. Overall, the choice of solution represents a trade-off between spatial conflicts and interventions in urban spaces and the city environment for the surface alternatives, the weighting of public transport system considerations versus walking and cycling, and the high costs associated with an underground turnaround in bedrock. All alternatives represented acceptable solutions for light rail operations and the remaining transport system.

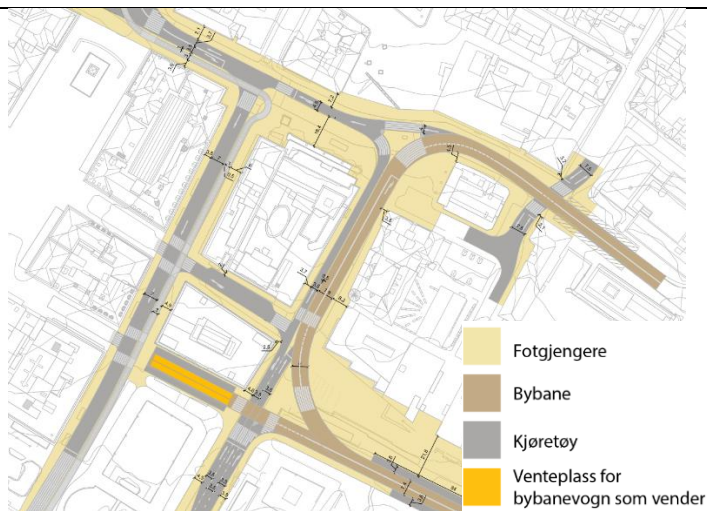
The project and the parties to the Miljøløftet partnership have adopted an underground turnaround in bedrock at Sverresborg stop as the baseline principle for the zoning plan.

Table 1-1: The following is a summary of the most critical aspects identified in the evaluation of turnaround alternatives in the city centre.

Fotgjengere Bybane Kjøretøy Venteplass for bybanevogn som vender  <th data-bbox="845 1256 1359 1744"> Kaigaten The solution was deemed space-demanding, thereby having negative impacts on the urban and cultural environment at Byparken and Gulating. However, it provides an effective solution for the public transport system and light rail users, while also enabling a continuous cycle path at relatively low costs. </th>	Kaigaten The solution was deemed space-demanding, thereby having negative impacts on the urban and cultural environment at Byparken and Gulating. However, it provides an effective solution for the public transport system and light rail users, while also enabling a continuous cycle path at relatively low costs.
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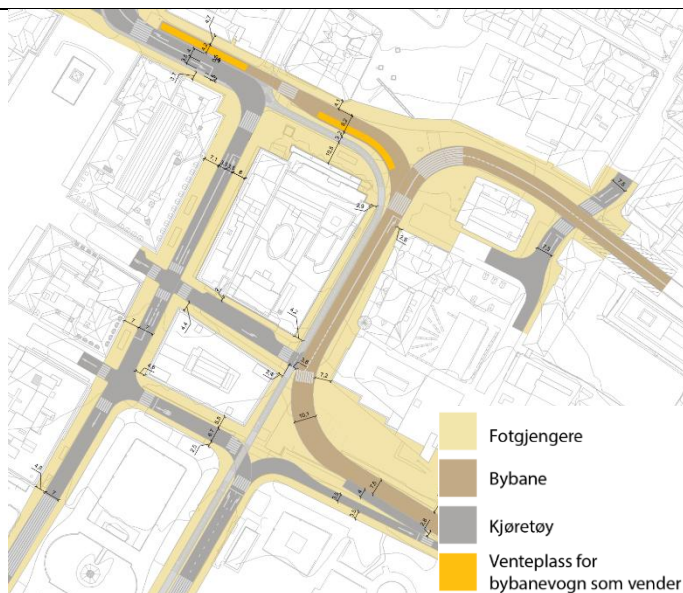
Initially Discarded Alternatives for Operational Turnarounds from the South:

- Strandgaten
- Vågsallmenningen
- Peter Motzfeldts gate – turnback track
- Peter Motzfeldts gate – reversal loop
- Rådstuplassen
- Heggebakken (tunnelportal)
- Bystasjonen
- Allehelgens gate
- Olav Kyrres gate



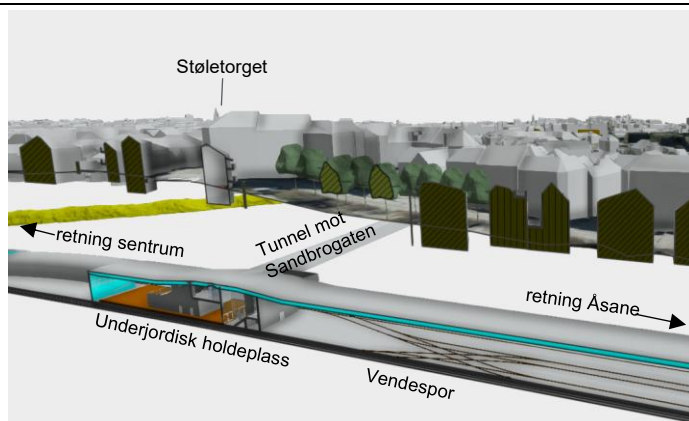
Starvhusgaten

This alternative entails fewer negative impacts on the urban environment as it resembles the current situation; however, it prevents the transformation of Starvhusgaten into a more peaceful urban space. It provides an effective solution for the public transport system and light rail users, and enables a continuous cycle path. Furthermore, costs remain low as some of the existing infrastructure can be repurposed.



Småstrandgaten

This solution entails significant negative impacts on the urban environment, as the turnback track occupies an urban space that would otherwise remain unaffected by the light rail. It is a less favourable solution for light rail operations due to the relatively long deadhead mileage required. However, it enables a continuous cycle path, though it remains the costliest of the surface alternatives.



Underground turning arrangement Sverresborg

Avoids space-demanding surface turning arrangements in the city centre and provides an efficient solution for light rail operations. However, it represents a highly costly solution in terms of investment, operations, and maintenance. It also generates more surplus excavated material and higher greenhouse gas emissions, though it allows greater flexibility for prioritizing other transport user groups in the city centre.

Recommendations regarding World Heritage:

- Turning arrangement in Kaigaten and light rail stop in Christies gate
 - *The measure is considered fundamentally unproblematic within the scope of the Heritage Impact Assessment (HIA/KUVA). However, it should be evaluated in the context of the broader transport solution across Torget, Øvregaten, and Bryggen. The proposed intervention is not expected to result in adverse impacts on the Outstanding Universal Value (OUV) of the World Heritage property or on associated supporting values. The overall level of conflict is therefore assessed as **negligible to minor***
- Turning arrangement in Kaigaten and stop in Kaigaten
 - *The measure is considered largely unproblematic in the context of the Heritage Impact Assessment (HIA/KUVA). However, it should be assessed in relation to the broader transport solution across Torget, Øvregaten, and Bryggen. The intervention is not expected to have any adverse effect on the World Heritage values or associated supporting values. The overall level of conflict is therefore assessed as **minor to insignificant**.*
- Turning arrangement in Starvhusgaten and light rail stop in Kaigaten
 - *The measure is, in principle, considered unproblematic in the context of the Heritage Impact Assessment (HIA/KUVA). However, it must be understood in relation to the broader transport solution across Torget, Øvregaten, and Bryggen. The proposed intervention does not adversely affect the World Heritage values or associated supporting values. The overall level of conflict is therefore assessed as **minor to negligible**.*
- Turning arrangement in Småstrandgaten and light rail stop in Kaigaten
 - *The three axes linking the Old Town Hall, Muren, and Rosenkrantz Tower north of Bryggen emphasise the spatial and historical relationship between the most significant Renaissance structures in Bergen, dating from the period following the mid-16th century. These interventions, associated with the feudal lords Valkendorf and Rosenkrantz, can be understood as part of broader state-led efforts to counterbalance Hanseatic influence in the city, including the relocation of the marketplace and town hall functions away from Bryggen and the strengthening of the fortress at Bergenhus. This triangular spatial relationship represents an important supporting value for the World Heritage property Bryggen, contributing to the understanding of the city's historical development and power structures. Although the axis between the Old Town Hall and Muren (via Småstrandgaten) is less clearly discernible today, it remains a significant historical connection within the urban structure. The introduction of a turning arrangement in Småstrandgaten would create a functional and visual barrier, further weakening this historical relationship compared to the current situation. On this basis, the level of conflict with the World Heritage property is assessed as **moderate**, primarily due to the adverse effects on historically significant spatial connections associated with the proposed turning arrangement.*
- Underground turning arrangement at Sverresborg and light rail stop in Kaigaten.
 - *It must be assumed that there is a significant risk of adverse impacts on the Outstanding Universal Value (OUV) of the World Heritage property Bryggen, with potential consequences that could affect its World Heritage status. Uncontrolled groundwater drawdown or instability in groundwater levels may adversely affect the preservation conditions of archaeological deposits and the timber bulwark foundations supporting the Bryggen buildings. Substantial changes in these conditions could lead to structural damage to the buildings. The risk is primarily associated with the proposed underground station at Sverresborg, including potential turning arrangements in bedrock, as well as the tunnel alignment behind Bryggen and the tunnel portal at Heggebakken. Further investigations into bedrock conditions and tunnel construction methods may influence this assessment. However, given the current level of uncertainty—particularly related to the proposed turning arrangement in bedrock—the overall level of conflict is assessed as **high**.*

Discussion

A number of different alternatives for light rail alignments, stop locations, and surface versus underground turnarounds in have been discussed. In this context, the relevance is primarily limited to solutions that may impact the Outstanding Universal Value (OUV) and supporting attributes of the Bryggen World Heritage Site. The choice between a surface or an underground turning arrangement is among these. The HIA (KUVA) consultant did not recommend an underground turning arrangement, on the grounds that it could possibly cause groundwater issues for the World Heritage Site and introduce some uncertainty. However, an underground turnaround in bedrock has been selected by the parties to the Miljøløftet partnership and serves as the baseline for further assessment and detailed design. The rationale for this choice is that an underground turnaround is more straightforward from an operational perspective and creates more space for other transport user groups in the city centre.

In Sandviken, the wooden building heritage constitutes part of the World Heritage Site's supporting attributes. The alignment and the location of the light rail stop have been adjusted to avoid conflict with the protected waterfront warehouse environment (*sjøhusmiljøet*) in Sandviken. Nevertheless, due to requirements for pavements and track geometry, a conflict with 'Rosegrenden' will arise, necessitating the relocation of three wooden houses. This relocation is secured through zoning regulations, and the buildings will be moved internally within 'Rosegrenden'. The wooden houses in Sandviken are a supporting attribute to the Bryggen World Heritage site.

2 Overall methodology

The HIA (Heritage Impact Assessment) is carried out in accordance with the method described in the Norwegian Environment Agency's guide *"ESIA for climate and environment M-1941"* [1].

Three concepts are central to this report. **Value** means an assessment of how important an area is for a topic. **Impact** is meant to be an assessment of how the same area is affected because of a defined measure. **Consequence** emerges from the juxtaposition of value and impact according to the matrix shown under point 3. In the table below. The consequence is an assessment of whether a defined measure will lead to improvement or deterioration in an area. As the HIA concerns the world heritage site *Bryggen*, the report will also respond to and relate to UNESCO's *Guidance and Toolkit for impact assessments in a World Heritage Context* [2]. More detailed information can be found in the referenced guides.

1. Assessment of value Based on available information the assessment area is divided in "sub areas". The "sub areas" is given a value based upon a scale from insignificant to a very large value. World heritage is always assessed to the highest value Insignificant Some value Medium value or Administrative Priority Large value or high administrative Priority Very large value, or highest Administrative Priority	2. Impact assessment Based on its value and the impact of the proposed action the impact is assessed based on a scale from improved to severely degraded. The impact is measured against a reference situation. Improved Insignificant change Somewhat degraded Degraded Severely degraded
3. Evaluate consequence for each sub-area The consequence for each sub-area is given by the results from valuation and impact assessment using the "konsekvensvifta".	4. Overall consequence Overall consequence for the various themes is set by compiling the assessment of the sub areas for each given alternative. Very large negative consequence (4-) Major negative consequence (3-) Medium negative consequence (2-) Some negative consequences (1-) Insignificant consequence (0) Some/medium positive consequence (1/2+) Major/very large positive consequence (3/4+)

2.1 Adaptation of M-1941 concerning World Heritage

The impact assessment method M-1941 has not been updated with an adaptation between UNESCO's Guidance and Toolkit for Impact Assessment in a World Heritage Context and M-1941 after UNESCO published its guide for impact assessments in relation to World Heritage on 29.07.2022. It is therefore necessary to explain some methodological adaptations that have been made to be able to use the recognised Norwegian KU method, M-1941 (Norwegian Environment Agency). The method (M-1941) says the following about World Heritage (our emphasis on important points):

As of 2026, Norway has eight areas on UNESCO's list of World Heritage Sites. Plans or measures that affect these areas will normally require a study in addition to what follows from the Regulations on Agricultural Development. This means that measures outside the World Heritage Area that may have a negative impact on values inside the area will also be investigated.

An assessment of the consequences of a plan or measures that may affect World Heritage Sites must meet the ordinary requirements of the Regulations on Cultural Heritage for all relevant topics related to the plan or measure. We refer here to the other chapters in the handbook for various environmental topics.

In addition, the status of a World Heritage Site means that the assessment must meet the requirements for assessment in UNESCO's guide on the assessment of World Heritage. The guide for this methodology can be found here: [Utrede konsekvenser for kulturmiljø - miljodirektoratet.no](https://utredning.kulturmiljor.no/).

A Norwegian translation of the guide is being prepared. This will result in a single, common document that meets both the assessment requirements in the KU Regulations, and the requirements for investigation in UNESCO's guide.

World Heritage Sites are created to preserve "outstanding universal values", abbreviated OUV. The OUV of each individual area or object is described in the enrolment decision to the convention. Possible impact on OUV is central when investigating plans or measures in World Heritage areas. Such studies will be carried out using the methodology developed by UNESCO.

If interventions are made that may have negative consequences for OUV (outstanding universal value), it may result in the area losing its status as a World Heritage Site. It is UNESCO that makes this assessment. When investigating plans or measures that may have consequences for OUV, there should be a dialogue with UNESCO, in order for them to have the opportunity to assess the plan proposal and the consequences of this.

2.1.1 OUV (Outstanding Universal Value)

When a World Heritage Site is inscribed on the UNESCO list, a formal declaration is made by the site's OUV (Outstanding Universal Value), showing why the site is granted World Heritage status. OUV rests on three pillars (see figure 2-1). The pillar "Meets Criteria" shows that the site meets the criteria for categorization as a World Heritage Site. The pillar "Integrity & authenticity" shows that the area in question is coherent and readable and that the remaining elements are authentic. Under the pillar "Protection & Management", it is assessed whether the area and the various components have a protection and management that highlights and safeguards OUV over time [2].

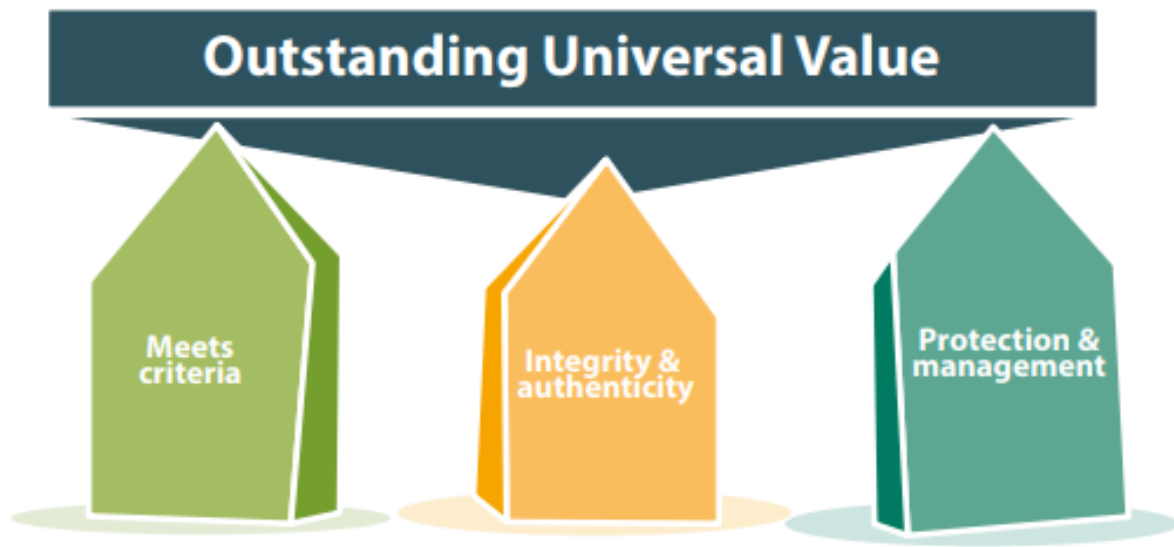


Figure 2-1: The picture shows how the criteria, integrity/authenticity and management support the World Heritage OUV. Source: Guidance and toolkit for impact assessment. Source: [2].

2.1.2 Values and attributes

The inscription text describes the various values and attributes of the World Heritage Site. The values are linked to what makes World Heritage unique and especially worth preserving for current and future generations. There may also be other values that are included as part of the impact assessment. The attributes are the various elements that underpin the values of the World Heritage Site. These can be physical buildings, but also other elements, for example linked to religion and culture. The word *attribute* is used specifically for World Heritage and is a key part of how World Heritage is managed and preserved. Loss of an attribute can cause the context to be lost, which in turn will affect OUV. The values and attributes are read from the World Heritage Site's OUV and will appear from "Tool 1" in UNESCO's Guidance and Toolkit [2] and provide an overview of values and attributes used through the assessment. The attribute may contain supporting values and significant objects that help to support the understanding of the attribute.

2.1.3 Buffer Zone and wider setting

All World Heritage Sites are delimited. All attributes associated with the World Heritage OUV will be within these limits. In a landscape, different measures can affect the World Heritage in a larger context, because of this, all World Heritage sites are covered by a defined buffer zone. The buffer zone is intended to protect World Heritage on a larger scale. The buffer zones are often covered by provisions in planning to protect the World Heritage status from impacts outside the defined boundaries, see figure 2-2.

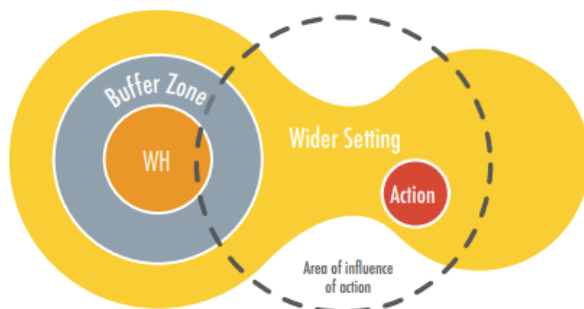


Figure 2-2: Area of influence of a proposed action in relation to the attributes of the World Heritage Property. A proposed action can have an impact on OUV even when it is not located within a World Heritage property or its buffer zone. If that is the case it will still need to be assessed. It is also important to be aware of the interdependence between a World Heritage property and its buffer zone and wider setting. Source: [2].

2.1.4 Assessing impact on world heritage using M-1941

Impact will be measured against the World Heritage attributes with impact assessments that include underlying elements (significant objects and other elements that belong naturally to the attribute). An overall impact is given on the attribute. The attributes will automatically have a very high value (M-1941). Prior to the impact assessment, possible impacts are identified. This is known as "Tool 2" in UNESCO's guidance and is intended to identify possible impacts and the severity of impacts.



Figure 2-3: Example of impact from proposed action. The impact on a historic urban environment created by sound and vibration from a proposed action. An impact is the interaction of the proposed action with an attribute of the world heritage property. In this example, the vibration from a proposed action may have an impact on the buildings and weaken their structural stability. Where these buildings are an attribute of the World Heritage property, this would lead to a loss of Outstanding Universal Value (OUV). Source: [2].

To assess impact, we will use provided guides in M-1941 and a comparison between value, impact and degree of impact. We've created the following table for assessing the impact on attributes. An attribute can contain several underlying elements and other important elements that together make up an attribute. Therefore, the impact of the attribute with the correct colour code is measured according to method M-1941.

Table 2-1: Example of a table used in the impact assessments.

Value	Attribute	Impact	Degree of consequence
		According to M-1941 - Improved - Insignificant change - Somewhat degraded - Degraded - Severely degraded	According to M-1941

2.2 Adaptation of the method M-1941 and UNESCOs guidance & toolkit

M-1941 is one of two preferred environmental impact assessment methodologies in Norway (M-1941 and V-712) and forms the framework for assessing value, impact, and overall consequence [1]. In a “standard” environmental impact assessment report, the value of sub-areas is assessed on a scale ranging from negligible to very large. World heritage must be assessed based on a very large value. This primarily applies to the attributes of the world heritage, whereas supporting attributes may be assigned a somewhat lower valuation depending on the specific world heritage property and context. There can also be variations on the scale within the “very large value” category. According to UNESCO guidelines, it is the defined attributes that must be assessed regarding impact and consequence. Under M-1941, it is the sub-areas valued according to the methodology that are assessed for impact and consequence. To assess an attribute and the impact it sustains from a given measure, the M-1941 guidance table for impact is utilized, applying a scale from improved to severely impaired/destroyed. Based on value and impact, the attribute's degree of consequence is determined using the “consequence matrix” shown on page 29. The compilation of these consequence degrees provides the basis for assessing the overall consequence measured against the reference alternative/zero-alternative.

2.3 Definition of subject topic according to M-1941

The M-1941 method describes cultural heritage as:

Cultural monuments are all traces of human activity in our physical environment. This includes localities associated with historical events, beliefs or traditions. Cultural environments are areas where cultural heritage is part of a larger whole or context.

Cultural monuments and cultural environments with their distinctive character and variation must be protected both as part of our cultural heritage and identity, and as part of integrated environmental and resource management.

It is a national responsibility to safeguard these resources as scientific source material and as a lasting basis for the experience, self-understanding, well-being and activities of current and future generations.

The field of cultural environment borders on landscape and outdoor life. The cultural environment often adds an extra dimension to outdoor life experiences. All cultural monuments are located in a landscape. The same applies to the cultural environment. Cultural environments differ from landscapes, for example, through scale. A cultural environment is usually smaller in scale than a landscape.

It is common to identify and delimit cultural environments within the planning area and the area of influence as part of an impact assessment. The cultural environments that are to be demarcated should have significant cultural environment values that may be vulnerable to the plan or proposed action.

2.4 Involvement of rights- and stakeholders

As stated in the UNESCO guidance [2], The World Heritage Committee recognizes the importance of involving stakeholders in the decision-making process. The involvement of stakeholders should be done in the early stages of the planning process but can also be done during the whole process. This depends on the stakeholder and the process of their involvement.

The UNESCO guidance mentions different types of stakeholders:

- **Rights-holders:** Those with legal or customary rights (owners).
- **Indigenous people:** Inheritors and practitioners of unique cultures and ways of relating to people and the environment (not relevant in Bergen).

- **Local communities:** Groups of people who possess a direct connection to the world heritage place (local residents and so on).
- **Environmental and heritage authorities:** Government bodies that have responsibility for, and specialist expertise in, the protection of the cultural heritage.
- **Other relevant authorities:** Municipal or regional authorities.
- **Other stakeholders:** Individuals, organisations and so on, may have direct or indirect interests and concerns about heritage resources, but may not enjoy legal or social entitlement to them.

To keep track of the different involvements a stakeholder engagement plan has been developed. As the timeframe of the impact assessment is short, the amount of stakeholder engagement has been reduced. Apart from *indigenous people* the stakeholders have been from all categories. The UNESCO advisory mission carried out in 2022 [2] was used as a basis for the selection of relevant stakeholders

Rights-holders: This refers to all owners of the Bryggen buildings, and all have been contacted. Some interviews have been conducted.

Local communities: This is possibly a large group of people and a lot of these are handled by the general planning process according to the planning and building act. However, there have been interviews with several homeowner associations in areas connected to the Bryggen area to cover this stakeholder-group.

Environmental and heritage authorities: There have been several meetings (also workshops) with national, regional and local heritage authorities throughout the process. They have been informed during the process on various solutions, possible impacts, risks and possibilities.

Other stakeholders: In this category the focus has been on various interest groups, tourists and other groups with some connection to Bryggen World Heritage property.

The stakeholders have been selected because they are relevant to the subject being discussed and planned. Early involvement prior to the official hearing process is also useful as risks and concerns can be addressed at an early stage. According to The Norwegian Planning and Building act, stakeholder engagement is mandatory, but the level of involvement can vary to a great degree. An early engagement of key stakeholders can empower stakeholders to give more relevant feedback during the official hearing processes.

Table 2-2: Table showing contact with relevant stakeholders.

Stakeholder category	Stakeholder	Contacted
Rights holders		
	<i>Stiftelsen Bryggen</i>	27.08.2025
	<i>Fav Eiendom</i>	01.09.2025
	<i>Jette Meyer</i>	01.09.2025, 13.10.2025
	<i>Richard Hansen</i>	01.09.2025, 13.10.2025
	<i>Thon Eiendom</i>	01.09.2025, 13.10.2025
	<i>AS Enhjørninggården</i>	01.09.2025
	<i>Atle Grung</i>	01.09.2025, 13.10.2025
Environmental, heritage authorities and others		
	<i>Riksantikvaren</i>	Several meetings throughout the project
	<i>Vestland Fylkeskommune</i>	
	<i>Byantikvaren</i>	
	<i>NIKU</i>	NIKU is informed through Riksantikvaren (The directorate for cultural heritage)

	<i>Verdensarvkoordinator</i>	Several meetings throughout the project
Local communities		
	<i>Lille Øvregaten velforening</i>	22.10.2025
	<i>Kroken Ve og Vel</i>	22.10.2025
	<i>Stølestrøkene</i>	25.11.2025
Other stakeholders		
	<i>Verdensarvråd</i>	Informational meeting held.
	<i>Fagråd</i>	
	<i>Bryggens Venner</i>	Several meetings held
	<i>Visit Bergen</i>	08.09. 2025
	<i>Bergen Guideservice</i>	08.09.2025
	<i>Bryggens Museum</i>	25.08.2025, 13.10.2025
	<i>Hanseatisk Museum</i>	25.08.2025
	<i>Bryggen Gruppen</i>	25.08.2025, several meetings held
	<i>Bergen Cruise Services</i>	29.09.2025
	<i>Bergens Mødre</i>	22.10.2025
	<i>Nei til bybane over Bryggen</i>	22.10.2025, 09.03.2025

Meetings have been conducted with stakeholders that responded to our contact via e-mail. As this is a project that has been ongoing for several years and several alternatives have been discussed extensively, one can expect some engagement fatigue.

2.4.1 Involvement of stakeholders in the overall planning process

Comments and input received during stakeholder engagement meetings from both the cultural heritage authorities and other stakeholders have been communicated to the Agency for Planning and Building Services throughout the planning process. The light rail tunnel alternative and the proposed prioritisation of public transport and cycling across Bryggen affect the interests of other stakeholders in the area only to a limited extent, and feedback from stakeholders other than the cultural heritage authorities has generally been of a more general nature. Nevertheless, these comments have been communicated through meeting minutes and discussions held during consultation meetings with the cultural heritage authorities.

Input received through meetings with the cultural heritage authorities has been given particular consideration in the recommendations made by the HIA consultant and has been communicated to the Agency for Planning and Building Services throughout the planning process as well as Norconsult.

2.5 Knowledge acquisition

The primary source of information is previous reports from the thorough work conducted since the first screening conducted in 2010. Several alternatives have been discussed over the years, also different variants of a tunnel alternative. During the process an independent HIA (Heritage Impact Assessment) was conducted by the consulting company Michael Kloos that also works as background information. New knowledge is also produced concerning groundwater and how changes in groundwater can affect Bryggen as well as details about the current proposed action. Meeting with stakeholders has also given knowledge

into the project. A full reference is given in chapter 7. The knowledge available during the impact assessment process is deemed satisfactory.

2.6 Knowledge gaps- and uncertainties

Since 2010 several impact assessments have been conducted as well as technical planning of the proposed action. This work has accumulated a lot of knowledge about the cultural heritage sites in the city but also about the groundwater and how it affects the archaeological deposits. During this planning phase the knowledge about groundwater movement is strengthened, on this basis a lot of the uncertainties that came up in previous phases are now less uncertain. Nevertheless, there are still some uncertainties concerning ground water movement and how it will affect the heritage site, it is likely impossible to remove all uncertainties, but the remaining uncertainties concerning the tunnel alternative has been reduced through more detailed analyses and groundwater modelling. It will need to be further reduced in the following phases of the project.

2.7 Requirements of the planning program

With regard to the planning programme, reference is made to the programme from 2012, which remains valid. The Heritage Impact Assessment (this document) is prepared as a supplementary assessment based on previous work. In the planning initiation published in 2025, the following is stated regarding *cultural heritage, cultural environments and the urban environment*:

“Planarbeidet skal finne løsninger som ivaretar kulturminner og kulturmiljø. Hensynet til kulturminner, kulturmiljø og den historiske byen skal vektlegges gjennom hele prosjektet. Uttalelse og innspill til planarbeidet fra kulturminnemyndighetene skal følges opp i dialog med de aktuelle myndighetene gjennom hele planarbeidet. Hensynet til UNESCOs verdensarv og den historiske byen skal ivaretas. Det skal gjennomføres en konsekvensutredning for verdensarven Bryggen (KUVA) for den nye løsningen. Kulturminneforvaltningen og en oppnevnt kulturminnefaglig gruppe for ny, formell buffersone for verdensarven vil inviteres til dialog i arbeidet” [3].

“The planning process shall identify solutions that safeguard cultural heritage assets and cultural environments. Consideration for cultural heritage, cultural environments, and the historic city shall be emphasised throughout the project. Statements and input from the cultural heritage authorities shall be followed up through dialogue with the relevant authorities during the entire planning process. Consideration for UNESCO World Heritage and the historic city shall be ensured. A Heritage Impact Assessment (HIA) for the World Heritage property Bryggen shall be carried out for the new solution. The cultural heritage authorities and an appointed expert group for the establishment of a new, formal buffer zone for the World Heritage property will be invited to participate in the process.”

2.8 Other local, regional and national frameworks and premises

Cultural heritage assets and cultural environments are primary sources of knowledge about, and understanding of, prehistoric societies and living conditions. They are also central sources of knowledge about historical periods and more recent times. These are non-renewable resources, and the national environmental goal was that the annual loss of heritage assets and cultural environments should not exceed 0.5% by the year 2020, as described in White Paper No. 16 (2004–2005) *“Living with Cultural Heritage”* (Royal Ministry of the Environment) [4]. The level of ambition was maintained and further continued in White Paper No. 35 (2012–2013) *“Future with Footing”* (Royal Ministry of the Environment) [5].

In White Paper No. 16 (2019–2020) *“New Goals in Cultural Environment Policy – Engagement, Sustainability and Diversity”* (Royal Ministry of the Environment), three new national goals are highlighted [6]:

1. Everyone shall have the opportunity to engage and take responsibility for the cultural environment.

2. Cultural environments shall contribute to sustainable development through comprehensive societal planning.
3. A diversity of cultural environments shall be safeguarded as a basis for knowledge, experience, and use.

The latter national goal continues the essence of the previous national goal of limiting the loss of cultural heritage assets.

Norway's World Heritage (Norsk Verdensarv) is a network consisting of the eight Norwegian sites inscribed on the World Heritage List and the four Norwegian points on the Struve Geodetic Arc (the property is transnational). The network has launched the *Strategy for Norway's World Heritage 2021–2024* [7]. The purpose of Norway's World Heritage is to:

1. create increased understanding of the responsibility, obligations, and opportunities associated with World Heritage
2. stimulate professional exchange and cooperation on World Heritage issues, and serve as a platform for sharing experience

In the new strategy period, focus has been placed on three main priorities:

1. Norway's World Heritage shall strengthen cooperation between the sites
2. Norway's World Heritage shall promote the shared interests of Norwegian World Heritage sites and be a resource in the development of sound World Heritage policy
3. Norway's World Heritage shall contribute to increased knowledge of Norwegian World Heritage and support increased local value creation

Furthermore, Norway has committed to the protection of cultural environments through several international conventions, such as the Granada Convention on the protection of the architectural heritage of Europe, the Valletta Convention on the protection of the archaeological heritage, the European Landscape Convention on the protection of landscape types, character, and identity, and the Faro Convention on the value of cultural heritage for society.

With regard to cultural heritage assets and cultural environments, strict requirements are set for land-use planning and transport planning through the Cultural Heritage Act and the Planning and Building Act.

The World Heritage property spans several municipalities and county boundaries [8] [9] [10] [11].

2.8.1 Thematic plans

Cultural heritage plan for Bergen 2021-2025

«Identitet med særpreget» (Identity with distinctive features) is a thematic municipal sub-plan for cultural heritage and cultural environments. The title reflects the important role and communal value of cultural heritage sites and environments in a changing society, as well as an ambition to preserve these values while exploring the opportunities they offer for urban development. The aim is to strengthen the identity and distinct character of the city and its districts through the sustainable management of elements that embody its history. The cultural environment plan for Bergen consists of three parts:

- Part 1 is an overarching strategy outlining the City's cultural heritage policy
- Part 2 is a knowledge base describing cultural landscapes, areas, structures, selected examples, and thematic analyses.
- Part 3 is an action plan with concrete measures to meet the challenges, visions, ambitions, and goals.

The plan also includes a digital mapping solution (Kulturmiljøkart) featuring cultural heritage sites and historical maps.

See front strategy (Sjøfrontstrategien).

The Strategy for the Waterfront in central parts of Bergen was adopted in April 2021. The strategy is not legally binding but is intended to form part of the professional and strategic basis for further planning. The political endorsement of principles and development concepts contributes to predictability regarding the City's objectives for the waterfront area. The strategy area extends from Breiviken in the north, via Sandviken, Vågen, Nordnes, Dokken, Møhlenpris, Store Lungegårdsvann, Damsgård, Puddefjorden, and towards Laksevåg in the northwest.

The objectives of the strategy are:

- The City's connection to the sea shall be strengthened
- Bergen's maritime identity shall be maintained
- Conditions shall be created for high-quality and diverse urban development
- The urban landscape and sea surface, which are important for the city's identity, shall be safeguarded

Management 2021-2025 for the World Heritage site Bryggen

The Management Plan 2021–2025 for the World Heritage property Bryggen was adopted by the Bergen City Council on 23 February 2022. The plan is based on Bryggen's inscription on the World Heritage List in 1979 and the World Heritage values as defined in the *Retrospective Statement of Outstanding Universal Value* (2013):

- Harbour district and early trading centre (Havnekvarter og tidlig handelssete)
- Hanseatic testimony (Hanseatisk vitnesbyrd)
- Building traditions (Bygningstradisjoner)

Management is carried out in accordance with current national legislation. The plan aims to ensure that the safeguarding of World Heritage values and supporting values is addressed in all public administration. The plan describes best practices, challenges, impact factors, and the buffer zone of the World Heritage property. The management plan and its structure are evaluated every four years.

“Kultur bygger samfunn”, City of Bergen

The City of Bergen's regional plan “Kultur bygger samfunn” [12] highlights the importance of Bryggen as a World heritage property and the focus on how the Bryggen property is seen from the local perspective. As a World Heritage property, Bryggen has significance that extends beyond the local context and must be understood within a regional, national, and international framework. Sustainable conservation and management are essential to safeguard its Outstanding Universal Value while balancing public use and tourism. Continued knowledge development, research, and cooperation between local communities, heritage authorities, museums, and academic institutions are important components of its long-term protection and presentation.

«Grønn strategi 2022», City of Bergen

To combat rising temperatures and climatic changes the City of Bergen has highlighted two goals. In 2030 Bergen aims to become a low-emission society and in 2050 Bergen aims to be a 1,5-degree community [13]. To reach its goals the city highlights four strategies towards 2030 and 2050:

- Direct cuts in emission
- Circulate available resources
- Protect nature
- Prepare for changes in the future

Buffer zone

Through the approved management plan for Bryggen, the City of Bergen has tasked the city's Antiquarian (Byantikvaren) with preparing a proposal for the extent of a buffer zone to be approved by the World Heritage Committee. The main objective of the buffer zone is to ensure that Bryggen's World Heritage values are safeguarded for the future, while facilitating sustainable development of Bryggen and the medieval city as an integrated part of Bergen, environmentally, socially, and economically. Central to this work are the following:

- Formalising protection and providing guidelines for management through land-use planning.
- Creating predictability for sustainable urban development.
- Contributing to increased understanding of the significance of Bryggen's world heritage values at the international, national, regional, and local levels.
- Strengthening sense of ownership and engagement through participation in the safeguarding of the World heritage property.

The work begins in Phase 1 with a strategic plan, including mapping, delineations, and analyses. This phase may identify factors influencing World Heritage values that are not typically addressed in standard land-use planning assessments. In Phase 2, the material will be integrated and formalised within land-use planning and the strategic framework. A key premise is that the area, based on the strategic/thematic plan, will be formally subject to conservation provisions within a zoning plan or designated planning zone.

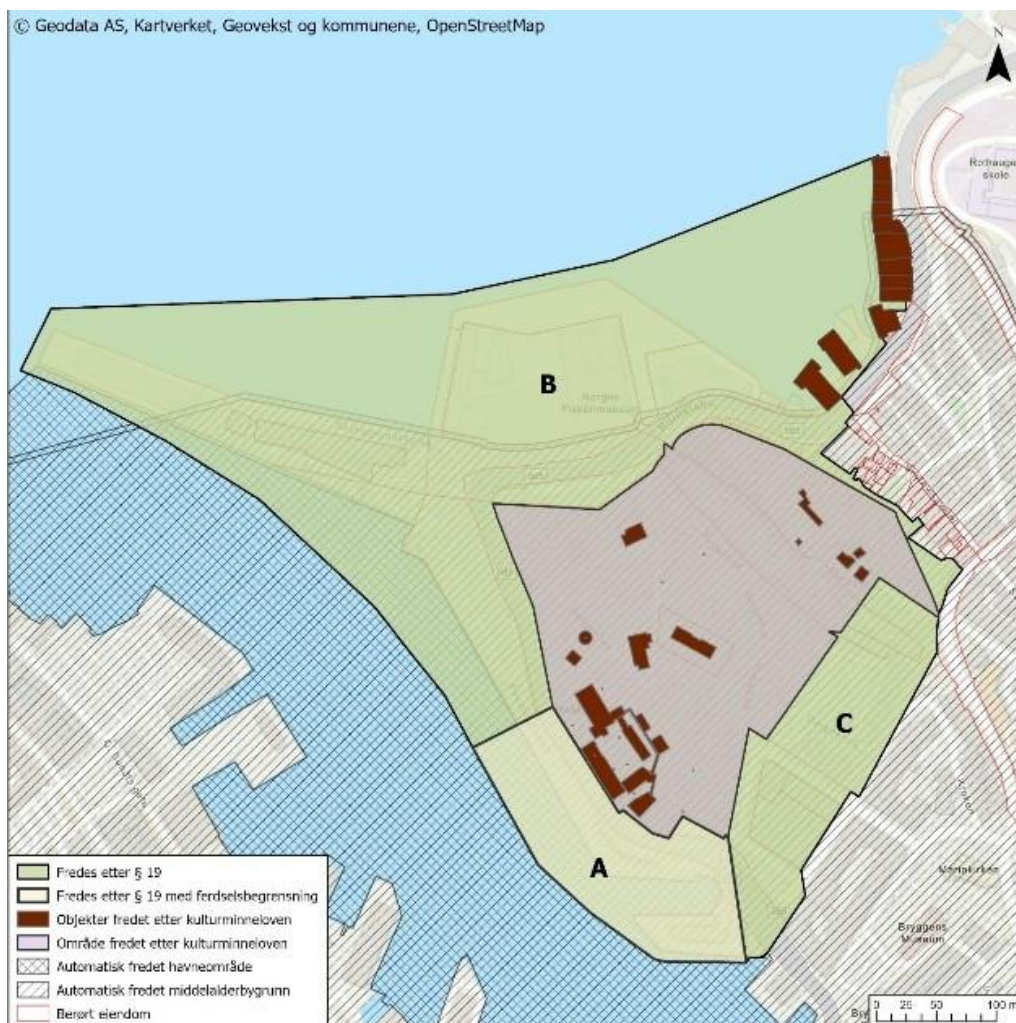
Proposal for protection (listing) of an area on and around Bergenhus, Sverresborg and Skuteviken

The Directorate for Cultural Heritage has prepared a proposal for protection of the area around Bergenhus Fortress. The proposal was circulated for public consultation with a deadline for comments of 1 February 2026. Following the consultation process, the proposal has been revised. This revised proposal will be discussed by the Directorate for Cultural Heritage with stakeholders in Bergen up to a second consultation round in autumn 2026. After this consultation, the proposal will be considered by the Bergen City Council. Ultimately, the City Council will decide whether statutory protection will be implemented.

The purpose of the protection is to:

- preserve the visual and environmental significance of Bergenhus Fortress and the boathouses in Skuteviken, as well as the cultural landscape they form
- protect scientific and research interests associated with the cultural heritage assets, cultural environment, and landscape
- ensure public access in and around Bergenhus Fortress and Byfjorden so that the fortress and its surroundings function as spaces for social interaction, recreation, and environmental value, forming a lasting basis for experience, identity, well-being, and activity for present and future generations

The figure below illustrates the revised proposal for protection.



Figur 4-4: The proposed protection pursuant to Section 19 covers the area marked in green, as defined by the Directorate for Cultural Heritage.

3 World Heritage Property

3.1 Organizing the national World Heritage Policy

The World Heritage Policy is part of Norway's overall environmental policy, which the Ministry of Climate and Environment is responsible for coordinating. The Ministry's subordinate directorates, the Directorate for Cultural Heritage and the Norwegian Environment Agency, are the most important executive government agencies in the World Heritage work, and it is within the budget items of the Directorate for Cultural Heritage and the Norwegian Environment Agency that the state allocates funds to safeguard the World Heritage Sites. Safeguarding the World Heritage values is a cross-sectoral responsibility. A total of 10 ministries has such sector responsibility. An interdepartmental state secretary committee has been appointed to take care of the interdepartmental responsibility. The county authorities, municipalities, the World Heritage Council and the owners of cultural heritage are other key players in the implementation of the World Heritage policy [14].

World Heritage is a status that is highly recognized internationally through the World Heritage Convention. In a national, legal context, the World Heritage Site is protected through the guidelines provided in plans in accordance with the Planning and Building Act and protection under special laws such as the Cultural Heritage Act and the Nature Diversity Act. UNESCO's "Operational Guidelines for the Implementation of the World Heritage Convention" states that all World Heritage Sites must have a functioning management system. An important document for the management system of the Bryggen World Heritage Site is the management plan [14].

3.2 Site manager

All World Heritage Sites have a World Heritage Coordinator who will act as a link between the administrative levels, the non-profit organizations, the dissemination institutions, and owners and users within the World Heritage area. Bryggen has had a World Heritage Coordinator since 2016. The coordinator is the secretary of the World Heritage Council and also has the task of notifying if the World Heritage values are at risk [14].

3.3 World Heritage Center

All the Norwegian World Heritage Sites must have a World Heritage Centre; which is a knowledge and dissemination institution where locals and visitors can gain knowledge about their own World Heritage and World Heritage nationally and internationally. The City of Bergen and Vestland County have decided that a World Heritage Centre will be established for Bryggen. In Vestland County's cultural plan 2015-2025, the county council allocated funds to the City Museum in Bergen and Museum Vest to investigate how a World Heritage Centre could be established. The work began with a workshop in which the administration, the museums and the Bryggen Foundation participated. Based on the work, Vestland County (former Hordaland County) financed a study on a World Heritage Centre at Bryggen, in which Bergen City Museum, Museum Vest and the Bryggen Foundation participated. The report looked at what needs a World Heritage Centre should meet in Bergen, the organization of dissemination, proposals for location, operating model and financing.

The World Heritage Council considered a case concerning the work on the establishment of a World Heritage Centre in 2018 (6.11.2018) and asked the Expert Council to prepare a draft of what a World Heritage Centre should contain and input on how the process should proceed. The Expert Council held a workshop on World Heritage Centres in June 2019 [14]. In the present time the work has continued towards establishing a World Heritage Centre and a new project has been drafted.

3.4 Statement of Outstanding Universal Value

The requirements for a Statement of Outstanding Universal Value (OUV) were introduced by UNESCO several years after Bryggen's inscription on the World Heritage list. In 2013 a retrospective OUV was prepared:

Bryggen is a historic harbour district in Bergen, one of North Europe's oldest port cities on the west coast of Norway which was established as a centre for trade by the 12th century. In 1350 the Hanseatic League established a "Hanseatic Office" in Bergen. They gradually acquired ownership of Bryggen and controlled the trade in stockfish from Northern Norway through privileges granted by the Crown. The Hanseatic League established a total of four overseas Hanseatic Offices, Bryggen being the only one preserved today.

Bryggen has been damaged by several fires through the centuries and has been rebuilt after every fire, closely following the previous property structure and plan as well as building techniques. Bryggen's appearance today stems from the time after the fire in 1702. The buildings are made of wood in keeping with vernacular building traditions. The original compact medieval urban structure is preserved with its long narrow rows of buildings facing the harbour, separated by narrow wooden passages. Today, some 62 buildings remain of this former townscape, and these contain sufficient elements to demonstrate how this colony of bachelor German merchants lived and worked and illustrate the use of space in the district. It is characterized by the construction of buildings along the narrow passages running parallel to the docks. The urban units are rows of two- to three-storey buildings signified by the medieval name "gård". They have gabled facades towards the harbour and lie on either one or both sides of the narrow passages that have the functions of a private courtyard. The houses are built in a combination of traditional timber log construction, and galleries with column and beam construction with horizontal wooden panel cladding. The roofs have original brick tiling or sheets, a result of fast repairs after an explosion during World War II. Towards the back of the gård, there are small fireproof warehouses or storerooms (kjellere) built of stone, for protection of special goods and valuables against fire. This repetitive structure was adapted to the living conditions of the Hanseatic trading post. The German merchants took up winter residence in the small individual wooden houses, and the storerooms were used as individual or collective warehouses. A true colony, Bryggen enjoyed quasi-extraterritoriality which continued beyond the departure of the Hanseatic merchants until the creation of a Norwegian trading post in 1754, on the impetus of fishermen and ship owners of German origin. Today, Bryggen is a significant part of the historic wooden city of Bergen.

Criterion (iii): Bryggen bears the traces of social organization and illustrates the use of space in a quarter of Hanseatic merchants that dates back to the 14th century. It is a type of northern "fondaco", unequalled in the world, where the structures have remained within the cityscape and perpetuate the memory of one of the oldest large trading ports of Northern Europe.

Integrity

Only around a quarter of the original buildings that existed in Bryggen remained after demolitions at the turn of the 19th century and several fires in the 1950s; the property is comprised of these remaining buildings. Notwithstanding, the medieval urban structure is maintained and the buildings include all elements necessary to demonstrate how Bryggen functioned: offices and dwellings at the front, warehouses in the midsection and assembly rooms ("Schøstuer"), kitchen facilities and fireproof stone cellars at the back.

Bryggen can be experienced as an entity within a larger harmonious urban landscape. It is connected more closely to the areas of small wooden dwellings beyond Bryggen and in the medieval city centre than to the larger 20th century buildings in its close proximity.

The risk of fire, excessive numbers of visitors as well as global climate changes with more extreme weather and possibly higher sea levels are some of the potential risks Bryggen faces today.

Authenticity

The Hanseatic period at Bryggen ended long ago, but the Hanseatic heritage is documented through buildings, archives and artefacts which are well preserved for posterity. There are also series of architectural surveys of the buildings from 1900 onwards.

The preservation of the buildings commenced on a larger scale in the 1960s and had made major progress by 1979, the year of inscription on the World Heritage List. Some buildings at the back were moved in 1965 to create an open area for fire emergencies, but no further changes have been made to the urban structure since. The solutions and methods chosen are well documented, and limiting the replacement of original materials has been an objective. Bryggen is built of wood, which is subject to rot, insect attack and ageing. Since 2000, there has been an increased focus on maintaining original methods and building materials in the restoration, with careful consideration given to the choice of material, paint, plugs, nails, etc. and the use of original tools as far as possible.

As the activity at Bryggen decreased after 1900, the buildings became derelict. However, from the 1960s the former trading in stockfish and commodities was gradually replaced by small arts and crafts businesses. An increase in the number of visitors has led to the establishment of restaurants and tourist businesses. This has resulted in inevitable changes in the spirit of the place, particularly along the front facades, whereas the atmosphere of the Hanseatic period can still be sensed in the more secluded area further back.

Protection and management requirements

- *Bryggen, including its cultural deposits, is listed pursuant to the Norwegian Cultural Heritage Act and is also protected through the Norwegian Planning and Building Act. The adopted protection plan includes an extensive area that functions as a buffer zone.*
- *Bryggen is privately owned and the majority of the buildings are owned by the Bryggen Foundation, which was established in 1962 with the objective of preserving Bryggen. The remaining owners have established a separate association to secure their interests. The stakeholders at Bryggen collaborate in different constellations of owners and authorities.*
- *"The Bryggen Project" was established formally in 2000. This is an extensive and long-term project for monitoring, safeguarding and restoring Bryggen, including both archaeological deposits and standing buildings.*
- *Bryggen is managed according to a management plan that is revised regularly. A fire protection system with detection and suppression has been installed and is continually being improved. Climate conditions are a key issue and measures have been taken to prepare for future changes. Possible impacts resulting from tourism are monitored.*
- *There is ongoing pressure for urban development in the vicinity of Bryggen. Any development which may have visual impact on the World Heritage property is monitored closely by the cultural heritage authorities.*

3.5 Values and attributes

3.5.1 Previous HIA process regarding values and attributes

In connection with the planning proposal for the BT5 Light Rail from Bergen city centre to Vågsbotn, a total of three impact assessments of World Heritage (HIA/KUVA) were prepared. As input to the planning process, two preliminary reports were prepared, the first in 2020 [15] and the second in 2021 [16]. The third and final report was submitted in the autumn of 2022 on the basis of the completed planning proposal [17].

Bryggen's Outstanding Universal Value is understood in the reports through the relationship between core values and attributes that make these values visible (see table 3-1). These include the medieval urban

structure, the wooden Hanseatic buildings, the harbour and quays, and the strong visual and functional connection to Vågen and the wider cityscape.

Overall, the reports emphasise that safeguarding Bryggen depends not only on preserving individual buildings, but on maintaining the integrated system of structures, setting, spatial relationships and historical functions that together convey its world heritage value. The attributes assessed in the final report is influenced by the release of the management plan in late 2021 [14].

Table 3-1: Overview of the three different HIA reports and their view on the key values. The reports were carried out by Michael Kloos planning and heritage consultancy.

2020	2021	2022
Bergen medieval cityscape and urban layout	Bergen medieval cityscape and urban layout	Continued visual and structural relation of Bryggen with Bergen medieval cityscape and urban layout
Medieval urban structure with public spaces/allmenninger and access roads	Medieval urban structure with public spaces/allmenninger and access roads	Continued visual and functional setting of Bryggen in living Vågen harbour
Medieval Vågen harbour and its quays	Medieval Vågen harbour and its quays	Cultural layers of medieval Bergen
Building conservation and continuity of Hanseatic building practice	Building conservation and continuity of Hanseatic building practice	Maintained built structure of the Hanseatic quarters and its quay
The relation between built structure of the Hanseatic Office and Bryggen quay	The relation between built structure of the Hanseatic Office and Bryggen quay	Story telling: Testimony of the Hanseatic League and the Hanseatic way of life.

HIA 2020

The preliminary report from 2020 highlights “Bryggen in medieval Bergen harbour city (context and setting of the WHP)” and “Bryggen Hanseatic Office” as the two key values. Within “Bryggen in medieval Bergen harbour city” three attributes are defined. They are *Bergen medieval cityscape and urban layout*, *Medieval urban structure with public spaces/allmenninger and access roads* and *Medieval Vågen harbour and its quays*. Within “Bryggen Hanseatic Office” the attributes *Building conservation and continuity of Hanseatic building practice* and *The relation between built structure of the Hanseatic Office and Bryggen quay* are defined.

HIA 2021

The report from 2021 continues the values and attributes defined in the first report (2020) and compares the alternative where light rail is built in daylight in front of Bryggen with an alternative where light rail is placed in a tunnel behind Bryggen. In summary, the daylight option has greater visual and functional impacts, while the tunnel option has greater structural risks and uncertainties. Both alternatives involve trade-offs and require mitigation measures to safeguard Bryggen’s Outstanding Universal Value.

HIA 2022 (Final report)

Overall, the assessment finds that the project brings both positive and negative impacts. On the positive side, the removal of car traffic, improved urban design, and prioritisation of pedestrians and cyclists strengthen accessibility, public space quality, and the relationship between Bryggen and the city.

However, the report identifies notable negative impacts, particularly:

- Visual impacts, where the size, height and frequency of light rail vehicles create a barrier and significantly affect key views, especially from Strandkaaien.
- Functional impacts, where the light rail introduces barrier effects in sensitive areas such as Bryggen Quay and Finnegården.

- Structural risks, especially related to groundwater changes and potential damage to archaeological layers at Bryggen Quay and Sandbrogaten.

Other reports

In 2021 the management plan for the Bryggen heritage site [14] was released. The plan has a listing of defined values, attributes and significant objects/elements. In late 2024 a Climate Vulnerability Index [18] was released. The report has a focus on climate change, and the values and attributes are defined and differ from the management plan released in 2021. UNESCO/ICOMOS carried out an advisory mission regarding the previous HIA process in 2022. The mission resulted in a report [19] that feature recommendations regarding the daylight option, bufferzone and the previous HIA process.

3.5.2 Values

Since this is a complementary assessment, it will not feature a stand-alone review and definition of values and attributes based on the declaration of Outstanding Universal Value (OUV). Instead, the relevant values and attributes in this report is based upon the Climate Vulnerability Index [18] which was carried out in 2024. In this report the key values of Bryggen are defined.

In the CVI report the declaration of Outstanding Universal Value is broken down into “key values” for Bryggen. The four values that were identified are:

- Hanseatic heritage
- Historic townscape and historic trading port
- Traditional timber structures
- Contemporary urban cityscape

The value “Traditional timber structures” contains the various physical buildings and mainly their visual appearance and traditional building techniques. For the proposed action and its possible impact on World Heritage property these values are not relevant to this impact assessment and the physical buildings are also covered under other values. The values relevant to this report are therefore:

- Hanseatic heritage
- Historic townscape and historic trading port
- Contemporary urban cityscape

3.5.3 Attributes

As part of the impact assessment process a review of the relevant attributes regarding the specific proposed action has been undertaken. The process is further documented in chapter 4 where the impact assessment is carried out. The relevant attributes are also simplified and shortened as the same attributes can be put under different key values. Defined attributes marked with red text colour are ruled out from further impact assessment and are deemed not relevant for this report.

Table 3-2: Key values and relevant attributes (black) and irrelevant attributes (red).

Key Value	Attribute
Hanseatic heritage	Existing buildings (tangible)
	Archives and artefacts which are well preserved for posterity (tangible)
	Offices and dwellings at the front, warehouses in midsection and assembly rooms, kitchen facilities and stone cellars at the back (tangible) (covered under the attribute “Existing buildings”).
	Archaeological deposits (tangible)

	Importance as part of the Hanseatic Leagues trading empire and centre for trade (intangible)
	Traces of social organization and illustrates the use of space (intangible)
	Regional conservation interest (intangible)
	Adaptation to living conditions of the hanseatic trading post (intangible)
	The structure of ownership (intangible)
Historic townscape and historic trading port	Ancient wooden urban structures (tangible)
	Supporting attribute - Compact medieval urban structures (tangible)
	Long narrow rows of buildings separated by narrow passages (tangible)
	Some original buildings remain (tangible)
	Supporting attribute - Historic harbour district (tangible)
	Supporting attribute - Archaeological deposits (tangible)
	Property boundaries (tangible)
	Adaptation to living conditions of the hanseatic trading post (intangible)
	Perpetuate the memory of one of north Europe's oldest ports (intangible)
Contemporary urban cityscape	The old wharf and 62 buildings of former township (tangible)
	Supporting attribute - Historic Wooden city (tangible)
	Historic city (intangible)
	World Heritage Listing (intangible)
	National conservation interest (intangible)
	Some parts privately-owned (intangible)
	The objective of preserving Bryggen (intangible)

The list of relevant values and attributes used during this report will therefore be concentrated on addressing the attributes that can be susceptible to impact (see chapter 4) during further assessment. The attributes marked with red text are deemed not relevant because the proposed action is not able to impact them or they are covered already through other attributes.

Table 3-3: Relevant attributes used for further impact assessment.

Value	Attribute
Hanseatic heritage	Existing buildings (tangible)
	Archaeological deposits (tangible) – inside of border
Historic townscape and historic trading port	Supporting attribute - Compact medieval urban structures (tangible)
	Supporting attribute - Historic harbour district (tangible)
	Supporting attribute - Archaeological deposits (tangible) – outside of border
Contemporary urban cityscape	The old wharf and 62 buildings of former township (tangible)
	Supporting attribute - Historic Wooden city (tangible)
	The objective of preserving Bryggen (intangible)

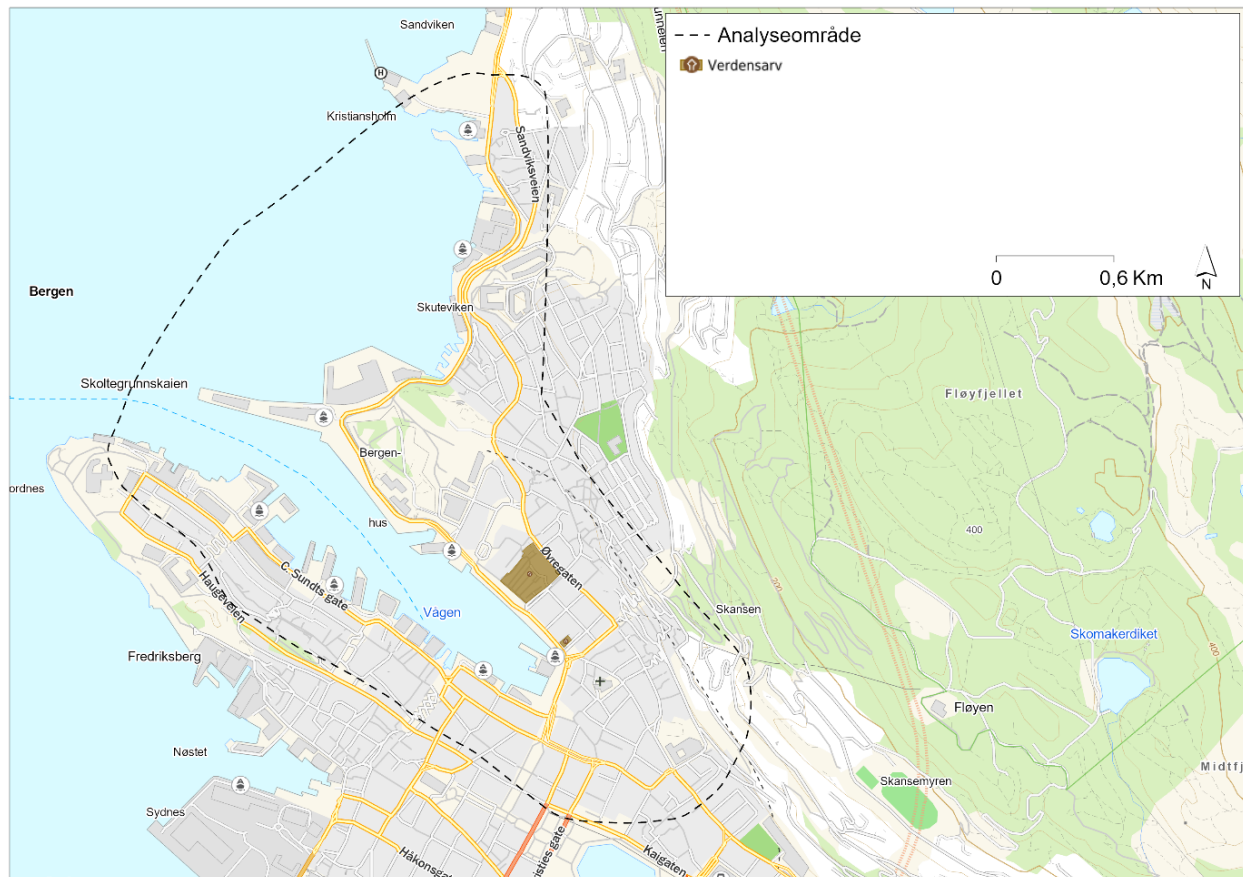


Figure 3-1: Assessment area, KUVA 2026.

3.6 Description of the attributes and valuation according to M-1941

According to the M-1941 method, World Heritage will be assessed based on a very large value. Supporting attributes that is not part of the World heritage property can have an individual value according to the methodology, its connection with the World heritage property will nevertheless imply a high valuation. In the following the individual attributes and supporting attributes are explained.

3.6.1 Attribute – Existing building (tangible) and Archaeological deposits (tangible) – Impact assessment

The wooden buildings and architectural structures at Bryggen can be traced back to the 12th century. Despite repeated destruction from fires and subsequent rebuilding, the overall building pattern and typologies have been consistently reproduced over the past 800–900 years. While fires have been highly destructive, they have also necessitated rapid reconstruction, which has likely contributed to the continuity and preservation of building traditions over time.

The earliest evidence of log construction dates from the 13th century, and this technique gradually became the dominant construction method at Bryggen. The existing buildings were constructed after the major fire in 1702, following established medieval traditions. The southern front building at Finnegården forms part of the World Heritage property, with Finnegården separated from the rest of Bryggen by *Murbryggen*, constructed in the early 20th century. Schøtstuen is the best-preserved of the remaining trading houses and has functioned as the Hanseatic Museum since 1872.

The buildings at Bryggen rest on timber bulwark foundations above extensive archaeological deposits. These cultural layers form part of the medieval city of Bergen (ID 89049) and are automatically protected. Archaeological investigations following the 1955 fire revealed up to ten distinct construction phases and cultural deposits exceeding eight metres in thickness.

The “fire chronology” at Bryggen—linking historically documented fires with stratigraphic evidence—forms a fundamental basis for understanding the development of the site. Subsidence, land reclamation, and changes to the harbour basin have resulted in large parts of the archaeological deposits now lying below present sea level.

Table 3-4: Values, attributes and assessed objects and elements.

Value level	Value	Attribute	Assessed objects and elements
OUV	Hanseatic Heritage	Existing buildings (tangible)	Bugården (id 87126)
			Bredsgården (id 86010)
			Enhjørningsgården (id 87134)
			Svendsgården (id 87166)
			Jacobsfjorden (id 87139)
			Bellgården (id 90851)
			Finnegården (id 87135)
			Bryggen Foundations (bolverk)
	Hanseatic Heritage	Archaeological deposits (tangible)	Middelalderbyen Bergen (id 89049) inside of the World Heritage property
			Verdensarven Bryggen i Bergen (id K5)

Valuation

The existing buildings are clearly associated with a social group of significant historical importance. They represent, to a very high degree, a historically important phase and are characterised by a highly valuable building tradition, with a strong and coherent internal cultural-historical relationship.

Value level	Value	Attribute	M-1941 value and scale
OUV	Hanseatic Heritage	Existing buildings (tangible)	Very large value
			

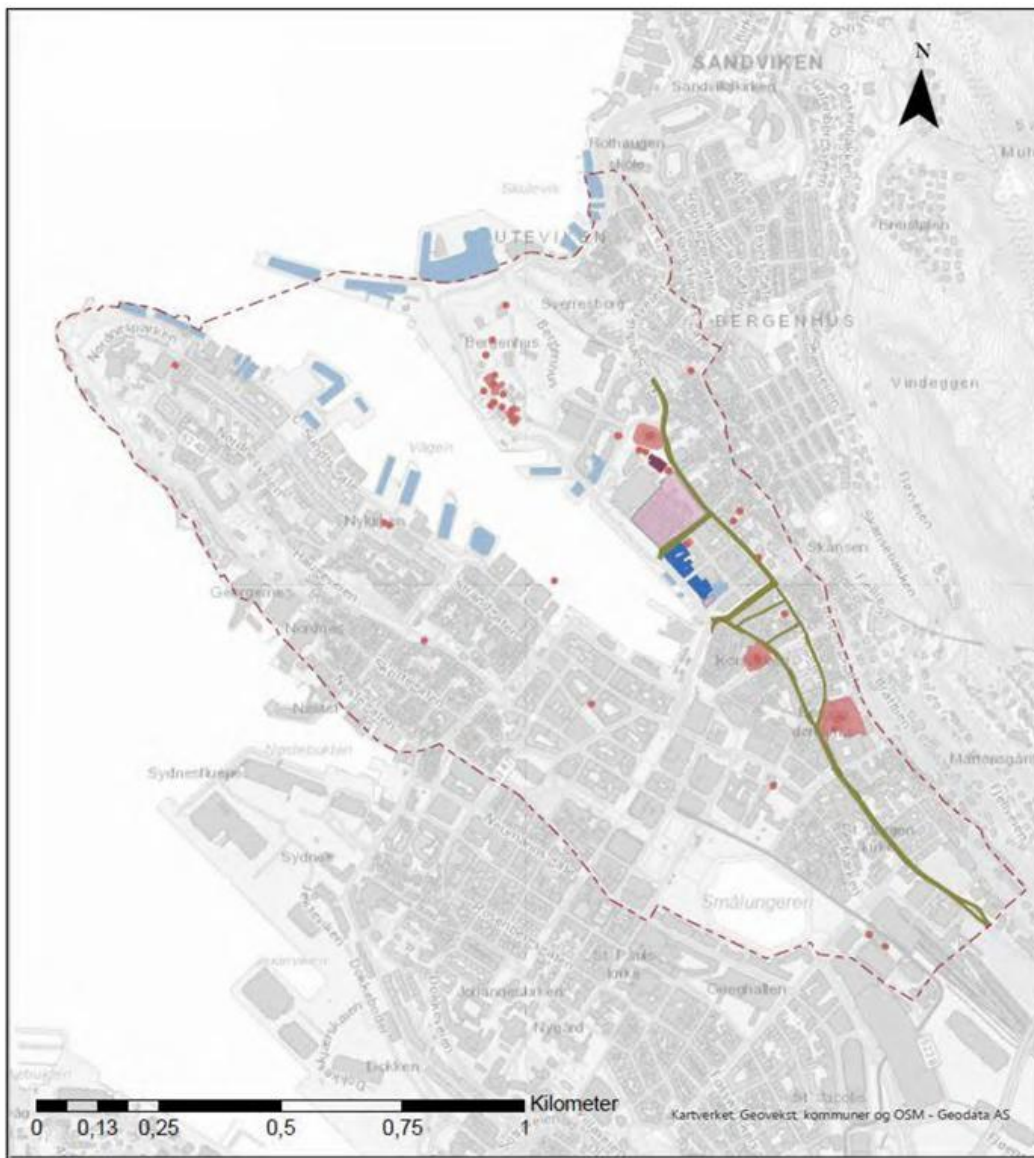
Tabell 3-5: Basis for valuation.

Kategori					
Source value					x
Faith and tradition				x	
Ethnic groups	x				
Social groups and contexts					x
Phases and activities					x
Building traditions, architecture and art					x
Cultural-historical context					x
Possibilities of use					x

3.6.2 Supporting attribute – Compact Medieval urban structures (tangible)

Outside the World Heritage property itself, and dispersed throughout the city centre, a range of areas, structures, and buildings contribute supporting value to the property. These elements are either directly associated with the historical development of Bryggen, contribute to the articulation and understanding of its historical narrative, or form part of its wider setting and experiential context. Although the city centre today largely presents as a modern urban environment, numerous elements from the medieval period and subsequent historical phases remain. While these may be less prominent or not immediately legible in cultural-historical terms, they collectively contribute to the setting of the World Heritage property and support the attributes that convey its Outstanding Universal Value (OUV), particularly in relation to historical continuity, spatial relationships, and underlying urban structure.

These elements therefore play a critical role in sustaining the integrity and authenticity of the World Heritage property by reinforcing the broader cultural landscape within which Bryggen is understood, interpreted, and experienced (see figure 3-2).



Bergen kommune, Byantikvaren

- | | | | |
|---|--------------------------------------|---|--|
|  | Verdensarvstedet Bryggen |  | Sjøboder og havnerelaterte bygninger |
|  | Grense for automatisk fredet bygrunn |  | Schøtstue-anlegget |
|  | Historiske veifar |  | Bygninger, ruiner og kirkesteder fra middelalderen |
|  | Murbryggen | | |

Figure 3-2: Overview from the management plan of the World Heritage property and its supporting values. The map is shown in the management plan.

In the area around Heggebakken, several traces of medieval structures are present. Bergen Cathedral, St. Catherine's Hospital, and Kong Oscars gate are particularly highlighted. In Kong Oscars gate and

Heggebakken, remains of a masonry structure have been identified, likely associated with the Franciscan monastery located south of the Cathedral, probably forming part of a garden complex.

Bergen Cathedral originates from Olavskirken in Vågsbunnen, dating back to the 12th century. The present building dates from the mid-13th century, although it has undergone several alterations over time. The church played an important role as a monastic institution during the medieval period, and later as a centre for education. The northern section of Kong Oscars gate is one of Bergen's oldest street alignments and historically served as the main access route into the city from the south. In the medieval period, it was known as *Sutarestreetet* (Shoemakers' Street). After the shoemakers relocated in the 15th century, the street was renamed *Skredderstreetet* (Tailors' Street), and in the 18th century it became known as *Adelgade*, meaning a public or main street. The section south of Heggebakken was referred to as *Inn mot Marken*.

The first Katarinahospitalet (St. Catherine's Hospital) was uncovered in the 1970s just north of Dreggsallmenningen (ID 95166). It was likely founded by King Håkon Håkonsson (1204–1263). The hospital is believed to have been destroyed by fire in 1248 and rebuilt in 1266 in the area now corresponding to Kong Oscars gate 42/44. Whether the ruin discovered at Dreggsallmenningen represents the original hospital remains uncertain and has been subject to debate in more recent research.

During the High Middle Ages, the hospital formed part of the ecclesiastical charitable system supported by the monarchy, particularly under King Magnus VI (Magnus Lagabøte). In the later medieval period, it was increasingly used by the German population of the city, supported by Mariakirken and the Hanseatic Office, and eventually became known as the "German Hospital," administered by the Hanseatic administration from the 16th century. The building is described by Mayor Hildbrant Meyer in the 1760s, including discussions regarding whether it should be under German or Norwegian control. It is described as a masonry structure with a hipped roof [20]. According to the Bergen City Encyclopaedia, the building was reconstructed on its previous foundation [21]. The hospital ceased operation, and the building was subsequently converted for use as a private school. It was demolished and replaced by a new building in 1884. Whether any archaeological remains of the original structure survive below ground remains uncertain. A Hanseatic boundary marker stone originating from the building has been incorporated into the masonry wall adjacent to the Schøtstuene assembly rooms at Bryggen.

The area and sites mentioned above are described in further detail in RA-B-001 KU Kulturmiljø Allehelgensgate – Heggebakken og parken Fredens bolig [22].

Mariakirken was initiated between 1130 and 1140 and completed around 1180. Following several fires in the 12th and 13th centuries, modifications were undertaken. The church was long referred to as the *German Church* after the Hanseatic League held full control from 1408 to 1766. After 1766, it continued as a church for the German congregation in Bergen until 1874 [23].

Domkirkegaten is known as a historic connection between All Hallows Church and the Cathedral. Previously known as *Nydam* (17th century) and *Brogaten*, it acquired its current name in 1857. The route was important already in the medieval period, initially consisting of a timber bridge linking the Cathedral to All Hallows Church across the innermost part of Vågsbunnen. The area was gradually infilled during the late medieval period. When the formerly marshy street was paved in the 16th century, stone was sourced from the ruins of All Hallows Church.

Øvregaten (Øvrestretet) and Lille Øvregaten form Bergen's oldest street alignment. This key route connects the medieval churches of Mariakirken in the north and the Cathedral in the south. In the early 14th century, several medieval churches were located along this route, which formed part of the main transport corridor between Bergenhus and the royal estate at Årstad. The city law of 1276 indicates that the street was already lined with buildings inhabited by craftsmen and merchants.

Following the establishment of the Hanseatic League at Bryggen, the character of the street changed significantly, becoming closely associated with the Hanseatic male community. By the 15th century, the area was characterised by taverns and brothels [24]. Nikolaikirkeallmenningen conceals remains of the medieval

urban centre, including the town square, town hall, and wine cellar (ID 95056). St. Nicholas Church, now lost, stood in the back of these structures. In 1480, the Hanseatic merchants constructed an administrative centre, the *Kjøpmannstuen*, in front of the town hall facing the sea, symbolising their dominance in the city.

The narrow passages between the Bryggen buildings were primarily used for goods transport and were closed at night. The organisation and layout of the built environment dates to the 12th century and have persisted through multiple fires and subsequent reconstructions. The need for rapid rebuilding after fires, combined with complex property structures, has contributed to the strong preservation of building traditions at Bryggen.

As indicated by the name *Kålhagene*, this area originally consisted of kitchen gardens used for cultivating vegetables and other plants. Although initially built upon, the area was cleared following the great fire of 1702. As part of fire prevention measures, construction was prohibited within a zone adjacent to Øvregaten. Over time, the area increasingly developed into a landscaped amenity space, although some utilitarian functions were retained [23].

Bergen's Old Town Hall was constructed as a private residence for the feudal lord Christoffer Valkendorf in 1558 and is one of the city's few Renaissance buildings. It likely formed an axis with another Renaissance building, *Muren* (1562), associated with the subsequent governor Erik Rosenkrantz. As a countermeasure to Hanseatic dominance at Bryggen, the city's marketplace and administrative functions were relocated to the southwestern part of Vågsbunnen in the mid-16th century.

Rådstuallmenningen, now Vågsallmenningen, became an important transport route linking Torget and Vågsbunnen with the Town Hall Square and administrative quarter, which served as Bergen's civic centre for centuries thereafter (see figure 3-3).

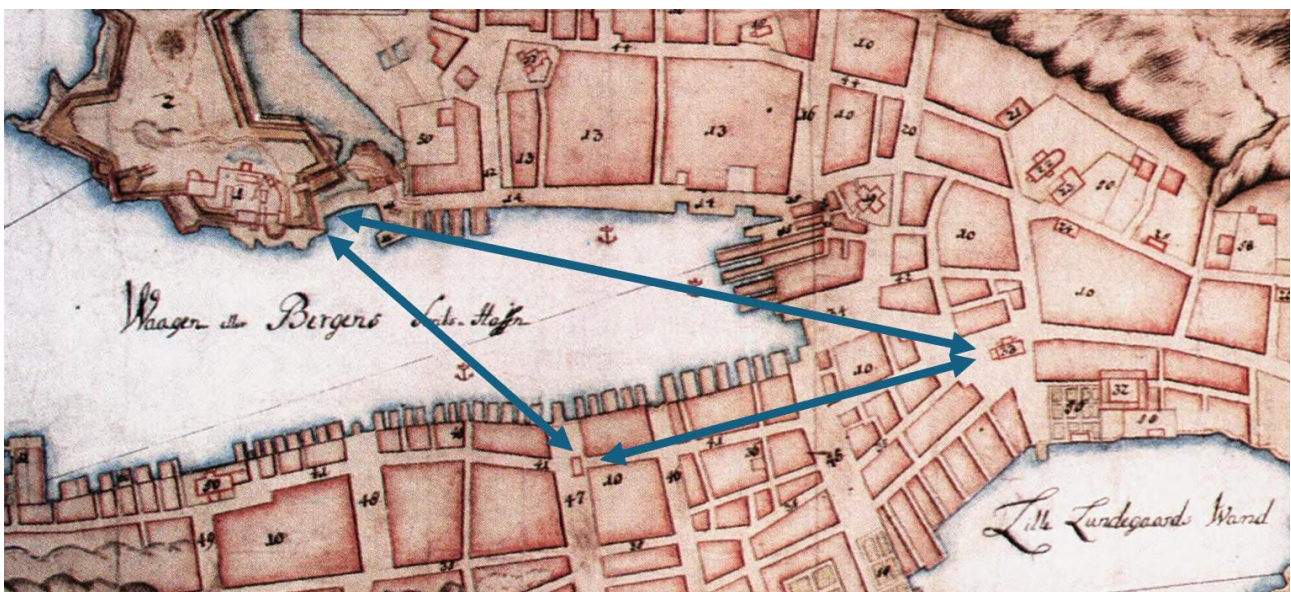


Figure 3-3: Peter Jacob von Wilster's map was drafted in the late 17th century and illustrates, among other features, the spatial relationship between the three Renaissance buildings: the Old Town Hall, Muren, and Rosenkrantz Tower. Although the street network evolved over time, the connection between the Town Hall and Muren can be traced in maps up until the urban regulation plan of 1916. At that point, Strandgaten was repositioned slightly closer to Vågen at Østre Murallmenningen, while still maintaining an important connection to the square in front of the Town Hall.

Tabell 3-6: Key values, attributes and assessed objects and elements.

Value level	Value	Supporting Attribute	Assessed objects and elements
OUV	Historic townscape and historic trading port	Compact medieval urban structures (tangible)	Bergen domkirke (id 83876) (outside of property)
			Katarina hospitalet (outside of property)
			Mariakirken (outside of property)
			Øvregaten (outside of property)
			Nikolaikirkeallmenningen (outside of property)
			Kong Oscarsgate (outside of property)
			Domkirkegaten (outside of property)
			Muren, Rådhuset og Holmen (outside of property)
			Allehelgenskirke/-hospital (outside of property)
			Rosenkrantzårnet (id 87123-3, outside of property)

Valuation

The attribute has high evidential value as a source for periods with limited or no historical documentation. The cultural-historical context is clearly expressed, and the built environment is characterised by a particularly valuable architectural tradition.

Value level	Value	Supporting Attribute	M-1941 value and scale
OUV	Historic townscape and historic trading port	Compact medieval urban structures (tangible)	Very large value
			

Table 3-7: Basis for valuation.

Faith and tradition					x
Ethnic groups	x				
Social groups and contexts	x				
Phases and activities				x	
Building traditions, architecture and art					x
Cultural-historical context					x
Possibilities of use				x	
Source value				x	

3.6.3 Attribute – Historic harbour district (tangible)

The World Heritage Site Bryggen with Finnegården is located on the east side of Vågen in Bergen. Bryggen is part of the historically central port district in Bergen. Bergen is one of Northern Europe's oldest port cities and was established as a trading centre as early as the 1100s. Eventually, the Hanseatic League established an "office" at Bryggen in 1350 and traded until 1754. "The German Office" was then replaced by "The Norwegian Office" (1754-1899). After this period, Bryggen was largely used for urban trade.

The original shoreline along Bryggen is far behind today's building facades. After an early beach phase, they built outwards in Vågen below Stretet (now Øvre gaten) with ever deeper quays, built on bulwarks. The expansions often took place in the aftermath of a city fire, and fire waste has been part of the filler in the tanks. The City Act of 1276 describes parallel watchmen's routes along the "Upper Long-Strete" and "along the piers", i.e. a thoroughfare in front of Bryggen's buildings. Today's buildings at Bryggen date from 1702. Prior to this, there was a quay with a longitudinal passage in front of the houses, and a more purely private quay area with stalls and seesaws out towards the quay front, interrupted by crowds, mostly in the inner part. Broadly speaking, this quay line was probably little changed in the period 1702-1899. As a Hanseatic area from the late Middle Ages on, however, the thoroughfare in front of Bryggen was not publicly accessible until its formal transfer to the city in 1868. The private quays were bought by the Port Authority from the end of the 1800s. In the years 1899-1903, the quay was extended along the innermost part of Bryggen, from Nikolaikirkeallmenning. Apart from Finnegården, the Bryggen buildings within the reef and the area were re-regulated. The new quay was built by bricking a foundation quay in the front, with filling at the rear edge against the original quay and piles. A similar quay expansion was carried out along the rest of Bryggen, the World Heritage Site, in the period 1918-24. Medieval and modern fillings in the harbour area are shown in figure 3-4 and figure 3-5). The connection between Bryggehuse and the quayside is today a very important cultural-historical connection that various measures in recent times have made less prominent.



Figure 3-4: The map shows the original shoreline in Bergen, with a dotted line showing the filled area in the late Middle Ages. The modern fillings in Vågen are more closely illustrated in the next figure (see figure 3-5). Source: Grind.

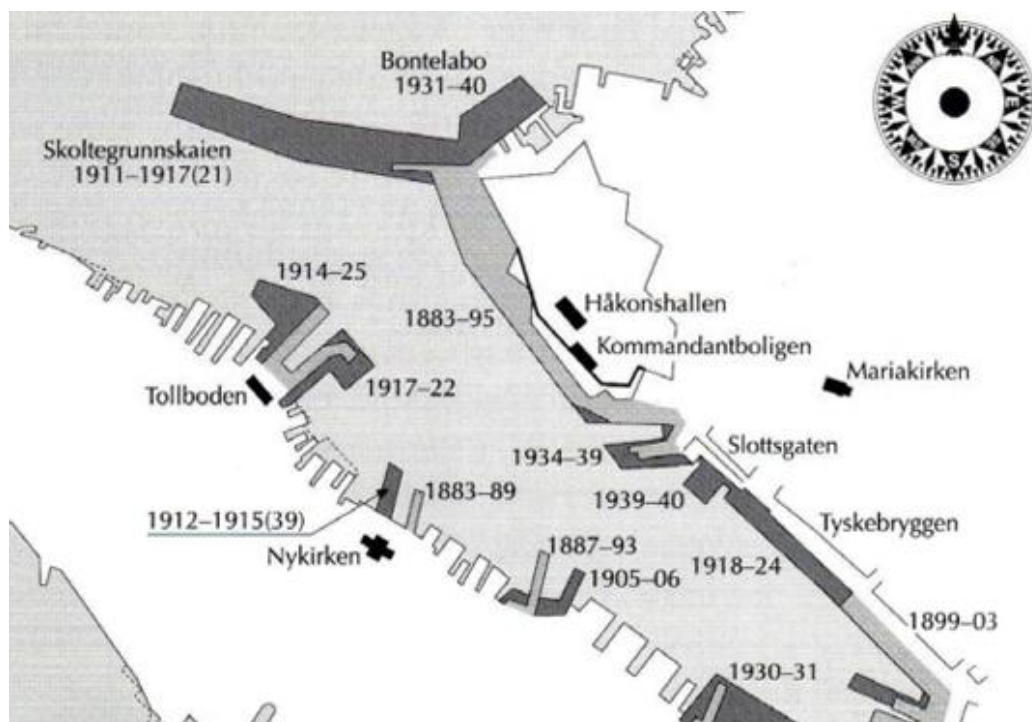


Figure 3-5: The quay expansions from the 1880s to 1940. Existing quays in 1903 are marked with light grey, extensions and new construction up to 1940 are marked with dark grey. Source: [25].

Table 3-8: Values, attributes and assessed objects and elements.

Value level	Value	Supporting Attribute	Assessed objects and elements
OUV	Historic townscape and historic trading port	Historic harbour district (tangible)	Relationship between Bryggen, the quay and Vågen (id K5, area outside of property)
			Finnegården (id 87135, area outside of property)

Valuation

The historic harbour district has a particular degree of cultural-historical connection with great source value and particularly valuable building traditions.

Value level	Value	Supporting Attribute	M-1941 value and scale
OUV	Historic townscape and historic trading port	Historic harbour district (tangible)	Very large value
			▲

Table 3-9: Basis for valuation.

Faith and tradition					x
Ethnic groups	x				
Social groups and contexts	x				
Phases and activities					x
Building traditions, architecture and art					x
Cultural-historical context					x
Possibilities of use					x
Source value				x	

3.6.4 Supporting attribute – Archaeological deposits (outside of World Heritage property)

Large parts of Bergen city centre are covered by the cultural heritage site, Medieval City of Bergen (ID 89049). Within the locality there are archaeological traces and cultural layers with very high source value wrapped in various types of waste and soil masses that have accumulated over time. Uniform humidity and the absence of oxygen that provide good preservation conditions, is vital for the conservation of the archaeological deposits.

Tabell 3-10: Values, attributes and assessed objects and elements.

Value level	Value	Supporting Attribute	Assessed objects and elements
OUV	Historic townscape and historic trading port	Archaeological deposits (tangible)	Middelalderbyen Bergen (id 89049) outside of the World Heritage property

Valuation

The cultural environment is very important as a source of periods with few or no historical sources. The cultural environment is clearly associated with a social group or shows a connection of particular importance to history in an easily readable way. The cultural environment has a very high degree of cultural-historical coherence and appears holistic with a number of traces from the Middle Ages that have great architectural knowledge value.

Value level	Value	Supporting Attribute	M-1941 value and scale
OUV	Historic townscape and historic trading port	Archaeological deposits (tangible)	Very large value
			

Tabell 3-11. Basis for valuation.

Category					
Source value					x
Faith and tradition					x
Ethnic groups	x				
Social groups and contexts					x
Phases and activities				x	
Building traditions, architecture and art					x
Cultural-historical context					x
Possibilities of use					x

3.6.5 Attribute – The old wharf and 62 buildings of former township (tangible)

The current condition of Bryggen is shaped by numerous fires that has repeatedly erased and rewritten the site. What is seen today is largely the result of reconstruction after the great fire of 1702, yet it rests upon foundations that reach back into the 12th century. Beneath the bulwark foundations lie archaeological deposits saturated in water. The deposits is an important source of knowledge into centuries of commerce, craft, and everyday life—preserved in dark, waterlogged soil that continues to demand careful management.

The 62 buildings, once part of a far larger mercantile landscape, embody the organization of the Hanseatic office that dominated Bryggen for generations. Each structure is part of a system: narrow plots aligned toward the harbour, linked by covered passageways and interlinked storage lofts. This arrangement reflects not only architectural tradition but also commercial discipline—an infrastructure for trade in stockfish and grain, governed by rules that regulated movement, storage, and interaction. Though the Hanseatic merchants are long gone, the spatial logic remains legible. One can still trace the rhythm of loading and unloading, the segregation of goods, and the inward-facing life of the trading yards. Several stone cellar houses have been preserved and show adaptation to the many fires and the need for fireproof storing facilities. A total of six stone cellars is preserved.

As a World Heritage property, it represents not merely a local history, but a transnational story of trade networks that linked Bergen to cities across northern Europe. The site's value lies as much in its integrity—the coherence of its plan, the continuity of its materials—as in its age. The connection between Bryggen and the city has been infrastructural, economic, and social. The harbour conditions dictated Bergen's rise, and Vågen and Bryggen enabled that the maritime world entered the city. Today, Bryggen anchors Bergen's identity, offering a tactile link between the modern urban landscape and the port from which it grew. The narrow passages behind the façades still open unexpectedly into shadowed yards, reminding the passerby that the city is not only what is seen at the surface, but what persists beneath it.

In this way, the 62 buildings stand not as isolated monuments, but as a collective organism—imperfect and continually adjusted. Their conservation depends on attention and knowledge, a recognition that heritage is not a static inheritance, but a condition that must be maintained through use as much as through protection. Bryggen, in its present state, is thus both fragile and resilient—a place where the past is neither distant nor complete but actively held within the structures that continue to define Bergen's edge against the sea.

Tabell 3-12: Values, attributes and assessed objects and elements.

Value level	Value	Attribute	Assessed objects and elements
OUV	Contemporary urban cityscape	The old wharf and 62 buildings of former township (tangible)	Old wharf consisting of 62 buildings remain of this former townscape

Valuation

The cultural environment has a very high source value as a source for periods with few or no written sources. It has a very large cultural-historical connection and is characterized by particularly valuable building traditions.

Value level	Value	Attribute	M-1941 value and scale
OUV	Contemporary urban cityscape	The old wharf and 62 buildings of former township (tangible)	Very large value
			

Table 3-13: Basis for valuation.

Faith and tradition					x
Ethnic groups	x				
Social groups and contexts	x				
Phases and activities					x
Building traditions, architecture and art					x
Cultural-historical context					x
Possibilities of use					x
Source value					x

3.6.6 Supporting attribute – Historic wooden city (tangible)

Around the City Centre and towards Sandviken there are several areas with wooden houses, from Heggebakken to Sandvikstorget (see figure 3-6).



Figure 3-6: The red areas are areas of high-risk fire spread and indicate wooden houses.

Bergen city centre contains a number of cultural environments that together make up an urban environment of wooden buildings. The buildings mainly date from the 17th and 19th century. The environments characterize large parts of the city centre areas, including along the eastern part from Heggebakken in the south to Sandvikstorget in the north. Housing structures have evolved since the Middle Ages, and Norway has a long tradition of building wooden houses. What is often referred to as "Bergen's wooden house" is in many ways a mix of several different styles and types of houses. Throughout the city's history, there have been city fires that have made various demands on the organization of residential areas. Measures such as the establishment of commons as functioning fire escapes through the dense wooden buildings have helped to define the development of the city centre and development trends in the historic centre. The fires of 1702, 1756 and 1835, for example, have led to a number of changes and ordinances that reduced building details such as arks, gables, roof angles, heights and eventually the requirement for masonry- instead of wooden façades in 1883. The wooden buildings in Bergen constitute highly important cultural environments that collectively illustrate the city's historical development.

Sandviken consists of a unique cultural environment where most elements from the historical structures of the 16th and 1700s with boathouses, hamlets, thoroughfares and inns are represented. The relationship between the former commercial zone with warehouses along the sea, and the associated residential areas or hamlets behind, is still clear and easily readable. The cultural environment has a number of protected stalls and is also covered by a protection plan. Sandviksboder 15-23 is a unique remnant of the shed environment that dominated the entire Sandviksbukten and is central to the cultural heritage administration's assessment of the area as of national and international importance. The area has cultural heritage values both due to the building's advanced age and authenticity, the built environment as an identity creator for the

district and the symbolic value for the city. The integrity of the area is high despite the barrier Sjøgaten represents.

Grendene (*neighborhood hamlet*) of Sandviken comprise an early form of urban workers' housing dating from the eighteenth and nineteenth centuries. Plot subdivision and development were controlled by the owners of the Sandviken estates, with the objective of minimizing the loss of productive agricultural land. As a result, the settlement pattern is exceptionally dense and compact. The buildings possess high historical illustrative value and provide important evidence of the social and urban development of Sandviken

Grendene are called: Strandens grend, Rosegrenden, Festergrenden, Fjæregrenden, Pyttergrenden, Grensegrenden and Mulebakken (previously called Møllesmuget). Rosegrenden lies between Sandviksveien and Sjøgaten, above Sandviksbodene.

There are also clusters of historic wooden buildings around **Heggebakken**, many of which date from the 18th and 19th centuries and possess high cultural heritage significance. These buildings make an important contribution to the historic character of the area and provide clear evidence of Bergen's traditional urban development and building traditions. **Barneasylet**, buildt in **1752**, is a protected heritage building under the Cultural Heritage Act (*vedtaksfredet*). Owing to its considerable age, architectural qualities, and historical associations, it represents a heritage asset of high significance.



Figure 3-7: *Heggebakken* as depicted by Julius Holck in 1908, illustrating its appearance as it is believed to have been in 1863. To the right is Bergen's Children's Asylum (Bergens Børneasyl) during the interwar period (Marcius Selmer, UBB-S-135; Olai Schumann Olsen, UBB-SO-0145). *Heggebakken 1* can be seen in the right-hand corner of the image.

Already in the medieval period, Skuteviken was used as a harbour area for the city. During the 17th century, the shoreline further north into Sandviken was progressively developed for harbour functions and as a staple port. The extended waterfront and sloping terrain, combined with watercourses, provided an early foundation for economic development in the area, including harbour activities and milling operations in Sandviken. Routes from Bergen towards the north followed the natural topography from the medieval period and are still largely reflected in the present street and road network.

From the 17th century until Sandviksbukten was incorporated into Bergen in 1877, the area was primarily characterised by its function as an important harbour for the city. With additional capacity for storing dried fish and other trade goods, activities in Sandviken contributed to Bergen's role as an important international port. The cultural landscape comprised boathouses with piers and jetties, ropewalks, mills, clusters of residential buildings, pleasure grounds, and farms with associated agricultural land, extending from Skuteviken in the south to Hegreneset in the north. Sandviksboder 12–24 (see figure 3-8), located along the outer side of Sjøgaten form part of a protected area (ID 91811) and consist of 13 individual heritage assets. The buildings are traditional Bergen boathouses, with timber-built storage structures up to three storeys, connected by external galleries. Originally, the buildings stood directly in the water, although the surrounding areas have since been partially reclaimed (ref. Askeladden.no).

Sandviksboder 3A, located just to the south, is also protected. This structure consists of parts of a 17th-century boathouse, now partially relocated and incorporated into a later building. The Sandviken boathouses are considered to constitute a supporting value for the World Heritage property Bryggen.



Figure 3-8: *Sandviksbodene 12-24* is protected under the Cultural Heritage Act (id 91811). Source: 1881.no

Tabell 3-14: Values, attributes and assessed objects and elements.

Value level	Value	Supporting Attribute	Assessed objects and elements
OUV	Contemporary urban cityscape	Historic Wooden city (tangible)	Wooden dwellings beyond Bryggen and in the medieval city centre (outside of property)
			Sandviken area (outside of property)
			Sandviksbodene (id 91811, outside of property)
			Heggebakken (outside of property)

Valuation

The wooden building environment in Bergen is characterised by buildings of particularly high value, reflecting a distinctive architectural tradition and a strong and coherent cultural-historical context.

Value level	Value	Supporting Attribute	M-1941 value and scale
OUV	Contemporary urban cityscape	Historic Wooden city (tangible)	Large value
			

Table 3-15. Basis for valuation.

Faith and tradition					X
Ethnic groups	X				
Social groups and contexts	X				

Phases and activities				x	
Building traditions, architecture and art				x	
Cultural-historical context					x
Possibilities of use				x	
Source value				x	

3.6.7 Attribute – The objective of conserving Bryggen (intangible)

Bryggen is primarily privately owned, with the majority of buildings being owned by the Bryggen foundation (Stiftelsen Bryggen). The Finnegården building is owned by the City of Bergen. The Bryggen foundation was established in 1962 with the objective of preserving Bryggen. The remaining private owners have established a separate association to secure their interests.

Both the remaining buildings and the archaeological material have traces in them that allow us to say something about material quality, building practices, adaptation to demanding ground conditions, tool use and execution, both before and after the fire in 1702. This knowledge is important when the buildings are to be professionally put into good condition, so that we can preserve the remains in the best possible way for the future. It is not only the buildings that we want to preserve with their entire history, but also the knowledge of the building materials and tools. For Bryggen's long-term preservation, it is crucial that the craft traditions are safeguarded and developed.

Knowledge of the World Heritage and expertise in the work of safeguarding and preserving the World Heritage values are crucial for the future of the World Heritage status. The expertise is of a craftsman, dissemination, legal and planning nature, and must be found in the sum of those who own and work with the World Heritage values.

In connection with the renovation work at Bryggen, a lot of knowledge has been acquired related to the buildings themselves and building traditions. Continuous work is being done to ensure documentation and how best to preserve the knowledge for posterity, and to ensure that it is a good source of knowledge dissemination and research. The grant scheme for securing and renovating Bryggen finances a material bank for various types of materials for which there is a long delivery time or materials that need to be stored.

About 20 years ago, major subsidence damage was discovered that was caused by changing groundwater conditions and chemical processes. The environmental monitoring program measures various parameters through groundwater level measurements, multi-parameter sensors, weather stations and soil profile measurements. Through the results of the measurements, various measures are proposed and considered to improve the situation or implement temporary or permanent measures. It is important that future measures do not complicate the monitoring and further management of the World Heritage.

Tabell 3-16: Values, attributes and assessed objects and elements.

Value level	Value	Supporting Attribute	Assessed objects and elements
OUV	Contemporary urban cityscape	The objective of conserving Bryggen (intangible)	World Heritage property

Valuation

Bryggen is assessed as having very high heritage value, reflecting its Outstanding Universal Value (OUV) and strong evidential, historical, and functional attributes. The building fabric, archaeological deposits, and associated craft traditions collectively demonstrate a high degree of authenticity and integrity, supported by long-term conservation practices and specialised expertise. Continued management, monitoring, and

safeguarding of knowledge systems are essential to maintaining the property's long-term preservation and World Heritage status.

Value level	Value	Supporting Attribute	M-1941 value and scale
OUV	Contemporary urban cityscape	The objective of preserving Bryggen (intangible)	Very large value
			

Tabell 3-17. Basis for valuation.

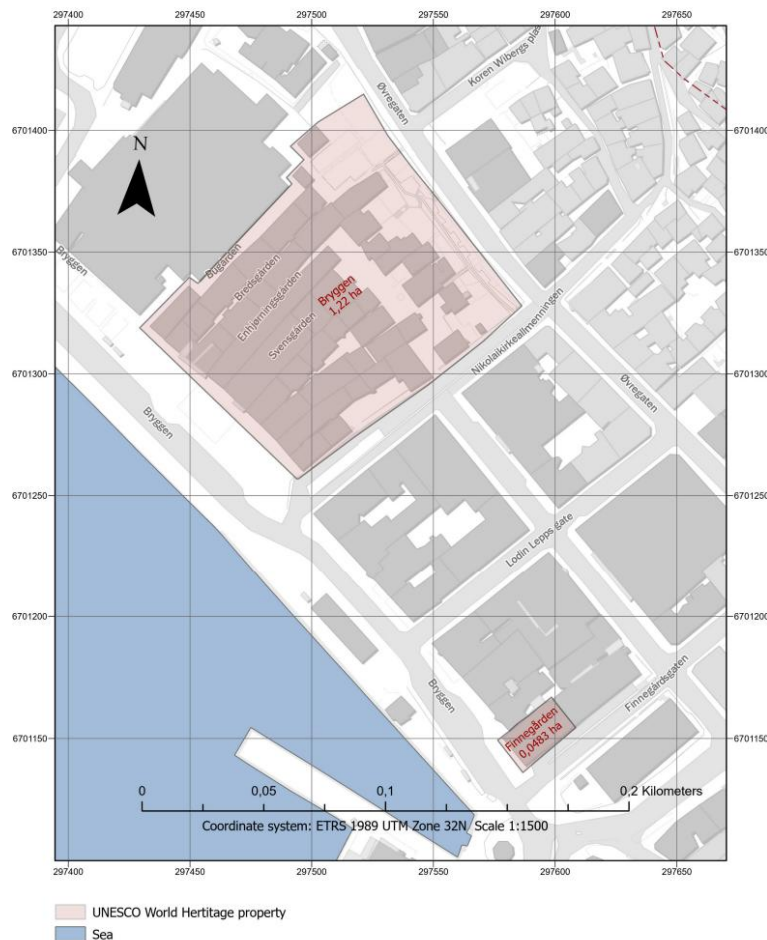
Faith and tradition					x
Ethnic groups	x				
Social groups and contexts					x
Phases and activities					x
Building traditions, architecture and art					x
Cultural-historical context					x
Possibilities of use					x
Source value					x

3.7 Management of the World Heritage property and wider setting

The management plan [14] describes the World Heritage property as follows:

"The World Heritage Cultural Heritage Site Bryggen is located on the east side of Vågen in Bergen. Bryggen is the historic central port district of Bergen, which is one of Northern Europe's oldest port cities. Bergen was established as a trading center as early as the 1100s, and the urban wooden buildings at Bryggen have roots back to the same period. Around 1350, the Hanseatic League established a "Hanseatic Office" at Bryggen and traded here until 1754. "The German Office" was replaced by "The Norwegian Office" (1754-1899). After this, Bryggen was increasingly used for urban trade. The remaining buildings show how the trading business functioned and how the Hanseatic League lived and worked without families in a closed social community within the individual building called "gård". Today, the buildings' facade gables have become an iconic image of both Bryggen and Bergen" [14] (authors translation).

There is currently no buffer zone surrounding the Bryggen and Finnegården World Heritage Property, but work is underway on this issue. The work is separate from this assessment and the buffer zone or study area in this report is relevant to this report only and has nothing to do with the buffer zone to the property.



UNESCO World Heritage Bryggen, Norway

Figure 3-9. Map showing the two components of the Bryggen World Heritage site. Source: [Bryggen - Maps - UNESCO World Heritage Centre](#).

3.7.1 Current state of conservation

The state of conservation of property has been the subject of one State of Conservation report to date, examined by the World Heritage Committee in 1994. The report highlights the need [11]:

- To create a buffer zone around the existing site and enclosed parts of the harbour and cityscape significant for the understanding of the historical context of Bryggen to integrate the cultural heritage dimensions in the planning process and local decision making.
- To strengthen the division of responsibilities between central and local governments and private owners.
- For systematic monitoring as a part of the day-to-day management of the site, with regular inspections and coherent maintenance strategy.

In addition, it was suggested that all treatments and changes to the monuments should be carefully documented and systematically archived.

3.7.2 Short overview of the heritage management system for Bryggen World Heritage property

The Directorate for Cultural Heritage describes the management system in the *Advisory Mission* from a national level to a local level in a simplified way [18] [19]:

The municipality is responsible in terms of the planning and building act, while the County and the national level (Directorate for cultural heritage) have a right to object to/stop plans within our responsibilities. The directorate also has the right to take over planning matters from the county if deemed necessary in special cases. The county has the first line responsibilities in relation to the cultural heritage act, with the exception of archaeology/the medieval city in Bergen specifically, where the Directorate has the first line responsibility. The Ministry of Climate and Environment is responsible for the World Heritage Convention as the State Party representative on the national level, with delegated powers to the two directorates Norwegian Environment Agency and Directorate for Cultural Heritage. In the case of Bryggen, the Directorate for Cultural Heritage ensures that the role and obligations of the State Party in relation to the World Heritage Convention are followed up. The Management Plan for Bryggen also outlines the roles and responsibilities of the different levels and agencies.

In 2018, a new governance structure was approved by all stakeholders. The need for a wider coordination between national, regional and local stakeholders required clearly defined roles and responsibilities for the main actors [14] [18]:

- **A world heritage board (Verdensarvåd)** – They are responsible for the protection of Bryggen in accordance with World Heritage requirements and the management plan. The World Heritage Board is composed of political representatives at the municipal and regional levels. It has a mandate to ensure long-term management and protection of Bryggen in line with guidelines and the management plan for Bryggen. It consists of two from Vestland County and two from the City of Bergen. Appointed for four years.
- **An Advisory board (Fagrådet)** - The Advisory Board (Fagrådet) is established to ensure that high quality and scientifically based development and management is implemented, and to ensure broad representation and contact with the high number of stakeholders at Bryggen. The Advisory Board prepares various matters for the World Heritage Board and is instrumental in the implementation of the management plan and related work plans.
- **World Heritage Coordinator** – The position is funded by the national government and employed at the Agency of Cultural Heritage Management, City of Bergen (Byantikvaren). The coordinator is the contact person for the WH property and is responsible for stakeholder involvement and management of the site.

The World Heritage coordinator (site manager) acts as the contact point for the World Heritage site and is the link between the different horizontal and vertical authorities and stakeholders involved in the conservation, management and protection of Bryggen. The coordinator is the secretariat for both boards mentioned above [19].

3.8 World heritage baseline and the reference situation

According to UNESCOs Guidance and Toolkit for impact assessments in a World Heritage Context [2] the current state of the World Heritage property, its Outstanding Universal Values (OUV) and attributes are used as a baseline during the subsequent impact assessment stages. The purpose of the baseline is to compare the future of World Heritage property with and without the proposed action using the reference situation (nullalternativ). The baseline can also be used as a reference point to monitor the situation during the construction phase to ensure that the heritage values are protected.

The baseline should describe the current status of the OUV and other heritage values and the attributes that convey them, both at the World Heritage property and in its buffer and wider setting. The baseline should also describe any other heritage or conservation values that are relevant.

- What are the current conditions of the World Heritage property and the attributes that supports its OUV and the other heritage/conservation values?
- How would the baseline change in the future in the absence of the proposed action?
- What was the property's state of conservation at the time of inscription?

During the thorough work with the current regulated zoning plan, there has been produced several assessments and reports concerning Bryggen, proposed actions and its conservation values. For example, the three Heritage Impact Assessments (HIA) reports that have been carried out between 2020 and 2022 [15] [16] [17]. The baseline is specifically discussed in the first report [15] and in the Climate Vulnerability Index (CVI) [18] carried out in 2024.

3.8.1 Current conditions

Since this is a complementary assessment, the current conditions will not be addressed in detail. As stated, the current conditions are based upon the previous Heritage Impact Assessment [17] [16] [15] and the Climate Vulnerability Index [18] carried out in 2024.

As the CVI concludes, two-thirds of (28 of 42) of the attributes were assessed to be in a good condition, with further 13 attributes evaluated as good with some concerns. One attribute is assessed as a significant concern and is referring to the wooden materials of Bryggen's buildings that are susceptible to rot, insect attack and aging.

Furthermore, there are six attributes that have improved since time of inscription while the others have remained stable. No attributes have deteriorated since the inscription [18]. A short review of the attributes assessed impact and a discussion around future conditions is briefly discussed in chapter 4. The map shown underneath (see figure 3-10) is an overview of the current status of the restoration work carried out on the Bryggen buildings.

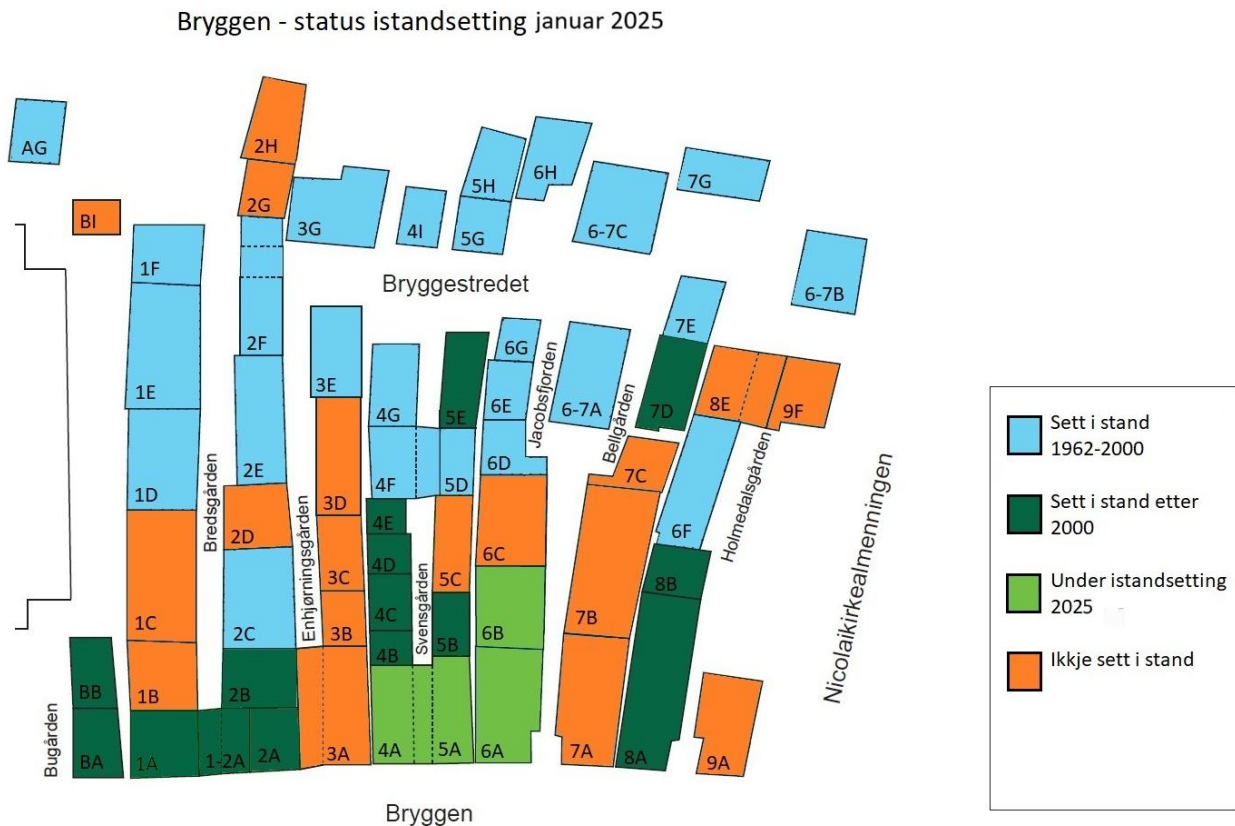


Figure 3-10: Restoration status Bryggen per 2025. Source: Vestland fylkeskommune (Vestland County). Blue: Restored between 1962-2000, dark green: restored after year 2000, light green: currently under restoration (2025) and orange: currently not restored.

The County further highlights that about 70% of the Bryggen buildings has been restored from the 1960's until the present day. The restoration is for the main part financed by grant funds. Finnegården which is part of the World Heritage property has also been restored, the building lifted by about 100 cm and new foundations has been laid to better the ground water situation [26]. Since the time of inscription, two quay warehouses have been demolished, and a timber deck has been installed in front of the wharf buildings.

3.8.2 What was the property's state of conservation at the time of inscription?

According to The Bryggen Foundation there have been few assessments concerning the specific cultural values. The early assessments were usually for tax purposes. The systematic work concerning the property's state and the meticulous plan on conserving the buildings started with the Bryggen Foundation architect Hans Jacob Hansteen in the 1960's. The foundation has also in the period bought buildings in the Bryggen compound with a goal of preserving them for the future and protecting the heritage values. In 1971 Hans Jacob Hansteen issued a report with a summary of the work up until that year and a plan for further work and priorities based on the conditions of the buildings. He sums up in 1970 that there have been various degrees of restoration on 25 buildings. 17 of these buildings were owned by the foundation. The goal of the restorations has been to conserve the historical process that has created Bryggen but at the same time raising the technical standard with a strong focus on conservation values.

In 1994 and 2000 Bryggen went through an external evaluation on behalf of UNESCO. The external evaluations highlighted concerns and a large need for restoration, but also a need for a buffer zone and measures to reduce traffic. In 1994 the evaluation highlighted [27]:

- To integrate the cultural heritage dimension in the planning process and decision-making.
- To strengthen the division of responsibilities between central and local governments and private owners.
- For systematic monitoring as a part of the day-to-day management of the site, with regular inspections and a coherent maintenance strategy. All treatments of the monuments should be carefully documented and systematically stored.

As historic aerial photographs from 1980 show (see figure 3-11), the road in front of Bryggen was much closer to the buildings. In later years, the situation has somewhat changed (see figure 3-12) and the road is situated closer to the quay, leaving more room in front of the Bryggen buildings. In the summer season this area is partially used as a serving area and is heavily used by tourists and visitors to the World Heritage sites.



Figure 3-11: The historical photo shows the situation at Bryggen in 1980, a year after being included on the World Heritage list. Source: 1881.no.

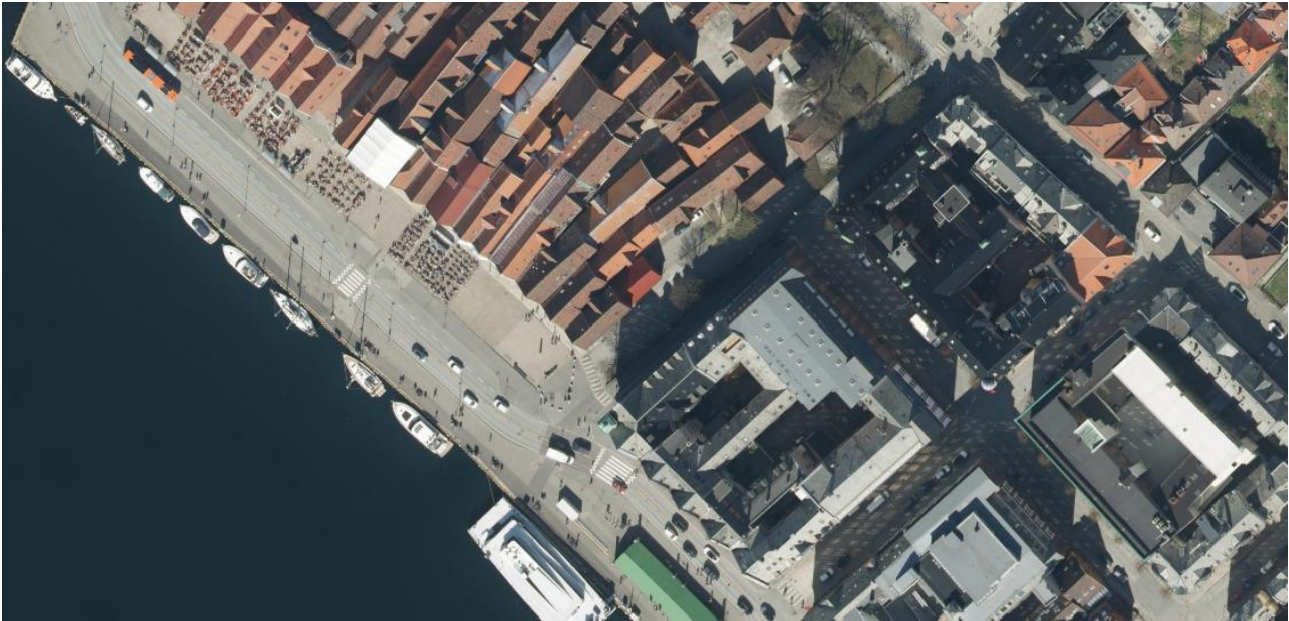


Figure 3-12: The same photo as above, but from 2023. Source: 1881.no.

3.8.3 Reference situation (0-alternativ)

The currently approved at-grade light rail alignment in front of Bryggen has not secured funding through the National Transport Plan (NTP). Furthermore, there is no political majority in Bergen in favour of implementing such a solution. Consequently, current discussions regarding the future protection, management, and sustainable development of the Bryggen World Heritage property are based on the premise that the “daylight” option will not be realised.

The zoning plans reference situation is based on the implementation of “Trafikkplan sentrum”. The effect of which will be significantly lower traffic in the city centre and Sandviken. The roads and current infrastructure will not be affected but the reduction of noise will create a more environmentally friendly city centre. In the case of a closed E39 Fløyfjell Tunnel the city centre and the road alongside Bryggen and Torget will be used as an alternate route. Today’s driving pattern and bus route network are set to organically develop, but a 50% increase through the city centre and Sandviken is expected. The number of buses in the peak hour is expected to increase from 100 to 150 in 2040. The increase will lead to bus queues. The extended Fløyfjell Tunnel is not built but the tunnel is upgraded according to the “Tunneloppgraderingsprosjektet” (Tunnel upgrade project). The cycle route in today’s situation is planned to be developed. The current zoning plan with the daylight option is not included in the reference situation. This zoning plan is approved, and the new proposal will repeal the currently approved plan. To summarize the reference situation:

- The City Centre Traffic Plan will be implemented. Vehicular traffic within the city centre and Inner Sandviken will be significantly reduced.
- The city centre will continue to serve as a diversion route during closures of the Fløyfjell Tunnel. Sufficient capacity within the road network must therefore be maintained to accommodate such situations.
- The current bus operating pattern and route structure will be retained. Public transport capacity through the city centre and Inner Sandviken will be increased by 50%, corresponding to a 50% increase in the number of bus services compared with today.
- The tunnel upgrading project for the existing Fløyfjell Tunnel will be implemented. This does not include the proposed new junction solution with a roundabout in Inner Sandviken.
- The planned extension of the Fløyfjell Tunnel will not be constructed.

- The existing cycling route through Inner Sandviken and the city centre will be retained and further enhanced.

In the proposed action the planned light rail enters a tunnel in Heggebakken and are therefore routed behind the Bryggen and Finnegården World Heritage site. This is opposed to the current zoning plan where the light rail was planned in a daylight solution in front of the Bryggen and Finnegården buildings. In the absence of the proposed action the reference situations suggest that "Trafikkplan sentrum" is introduced and implemented. Traffic calculations indicate that the traffic changes are primarily a result of the «Trafikkplan sentrum» and cannot be attributed to the Light Rail system alone (see chapter 3.8.3).

Reference situation discussion

In the current situation, there is a substantial volume of car and bus transport through the city core. Nevertheless, traffic data from 2011, 2018, and 2023 indicate that traffic volumes decreased in several areas of the city centre between 2011 and 2023. For instance, reductions were recorded for Øvregaten (down from 7,000 to 3,200), Torget (down from 15,000 to 12,000), and Bryggen (down from 10,000 to 8,600). The reduction occurring upon the implementation of the 'Central City Traffic Plan' (*Trafikkplan sentrum*) will be more significant, as indicated by recent traffic models. Private car traffic accounts for the largest share of this reduction. It is critical to note that these figures represent model projections rather than exact empirical data. Traffic models developed by Norconsult, project that traffic across Bryggen in 2050 will be 2,400 AADT, with heavy vehicles constituting 80%. In this context, heavy vehicles refer to buses. Torget and Øvregaten are projected at 2,600 AADT (73% bus share) and 1,600 AADT (7% bus share), respectively (see figure 3-13). Consequently, the 2050 scenario without the Light Rail to Åsane will likely be substantially better than the current situation. The reference situation does not include modifications to the traffic areas in front of Bryggen; hence, it must be assumed that the existing bus and taxi bays will remain. Scheduled buses stationary at the stops currently creates a barrier effect for the World Heritage Site. These lay-bys also allow tour buses to drop off tourists in close proximity to Bryggen when not occupied by taxis or scheduled buses. This contributes to mitigating the dispersal of the large volume of tourists and other visitors to the World Heritage Site. In the reference situation, a substantial improvement from the current situation will be observed leading up to 2050. Cycling infrastructure will develop during this period, and a continuation of the current situation is assumed, featuring a cycle lane towards the quay front as seen today.

Furthermore, the Central City Traffic Plan will render several city centre streets significantly more peaceful than today, improving conditions for pedestrians and cyclists. However, because traffic areas and network capacity must be maintained to accommodate potential closures of the Fløyfjell Tunnel, the scope for physical modifications to the road network remains constrained.

The reference scenario represents an improvement compared to the current situation, primarily due to significantly reduced traffic volumes and the pedestrianization/calming of central city areas. It only to a minor extent addresses challenges related to visitor management and the resulting physical wear and tear. Furthermore, it does not alter the location of the lay-bys in front of the World Heritage Site, which—coupled with an increase in the number of buses—could somewhat reinforce the barrier effect.

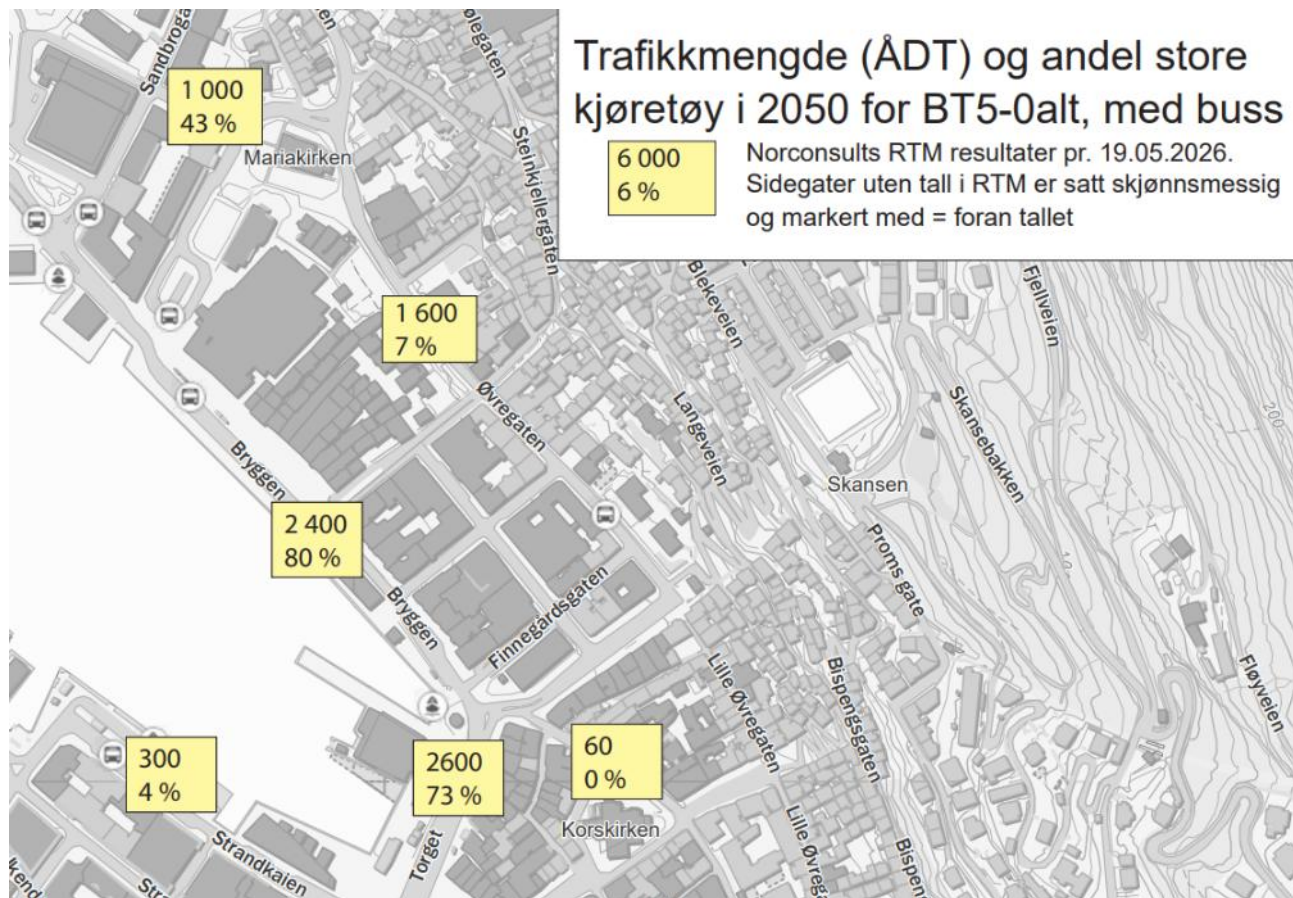


Figure 3-13: Traffic forecast for the reference situation in 2050. ÅDT is equivalent to AADT (Annual Average Daily Traffic). The percentage is the amount of buses.

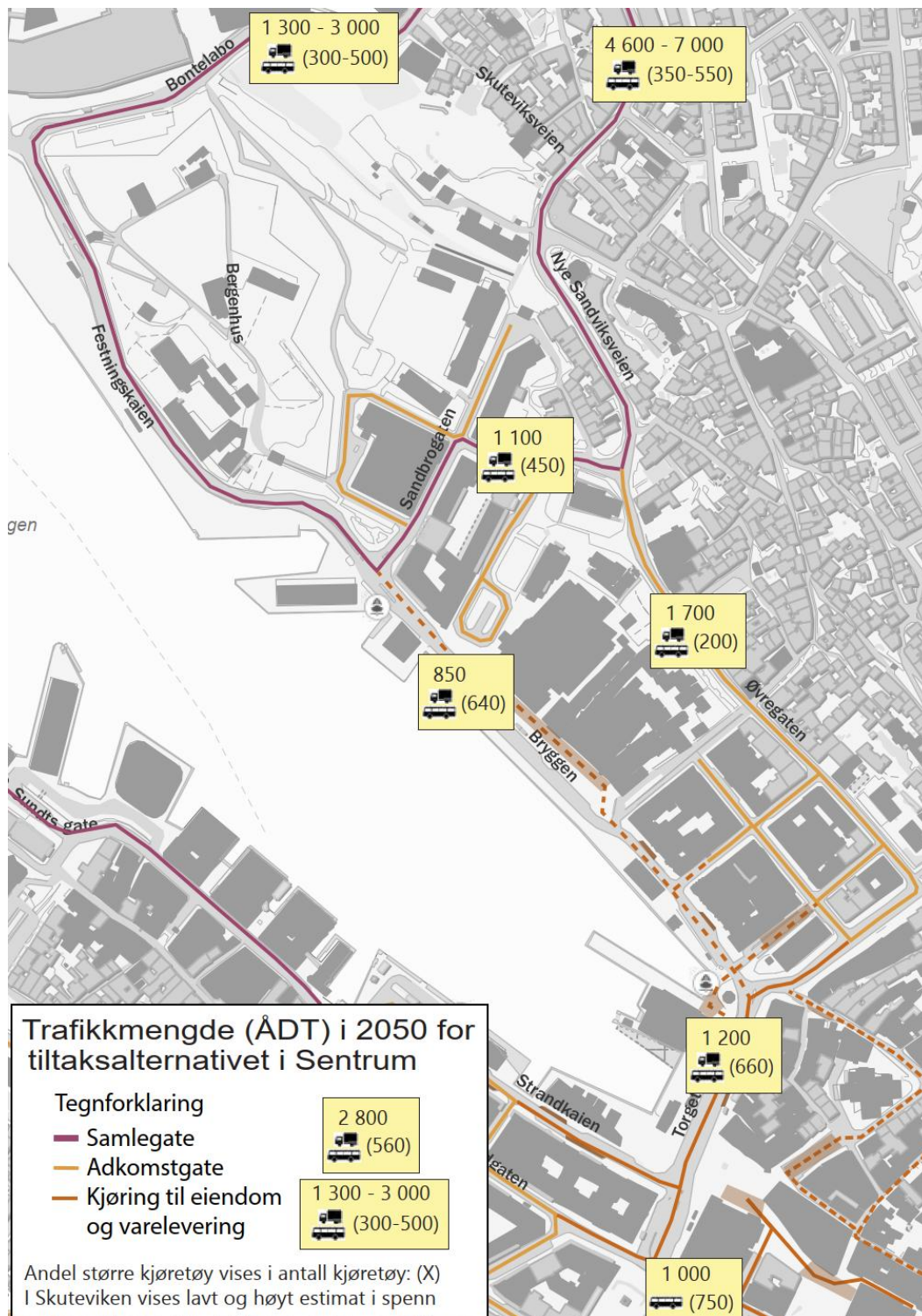


Figure 3-14: Traffic forecast for 2050, which is used as a basis for the planning work. Traffic figures for Sjøgaten and Nye Sandviksveien are given in intervals because the results of the two traffic forecasts for Sandviken, which are used as a basis for the plan, differ. ÅDT is equivalent to AADT (Annual Average Daily Traffic). In the parenthesis is the number of buses/delivery.

Traffic changes

The zoning plan proposal is based on the implementation of the Traffic Plan in the city centre in line with the City Council's decision, where Torget and Bryggen are closed to through-traffic, with the exception of public transport and local goods delivery. The current drive-through option to the north in the axis Christies gate - Småstrandgaten - Torget will also be closed to car traffic, see figure 3-15. As an emergency road for the Fløyfjell tunnel, it can be temporarily opened for through traffic along the axis Jon Smørs gate – Strandgaten/Strandkaien – Torget – Bryggen – Slottsgaten – Festningskaien – Sjøgaten. However, the need for this option will be greatly reduced when the Fløyfjell Tunnel is upgraded.

The introduction of the Traffic Plan for the City Centre entails a need to implement measures that are neither within the planning area of the cycle- og light-rail plan. To ensure necessary access to properties in different parts of the city centre, some of the streets are kept open to public traffic, such as local access streets without through-traffic. In addition to this, local delivery of goods is permitted where this is necessary for established business activities, and access to properties that have a drivable exit. In central streets with a lot of vulnerable road users, it is assumed goods delivery will be executed in limited periods during the day.

For Sandviken, Bryggen and Fjellsiden, the implementation of the principles in the Traffic Plan for the city centre entails a total restructuring of the traffic system, where all access to the area takes place from the north. This move will make it possible to prioritise walking, cycling and public transport here as well. For the link Festningskaien-Bontelabo-Sjøgaten, the move entails a significant reduction in traffic, but the share of heavy traffic will be relatively high due to commercial traffic to the port and bus traffic.

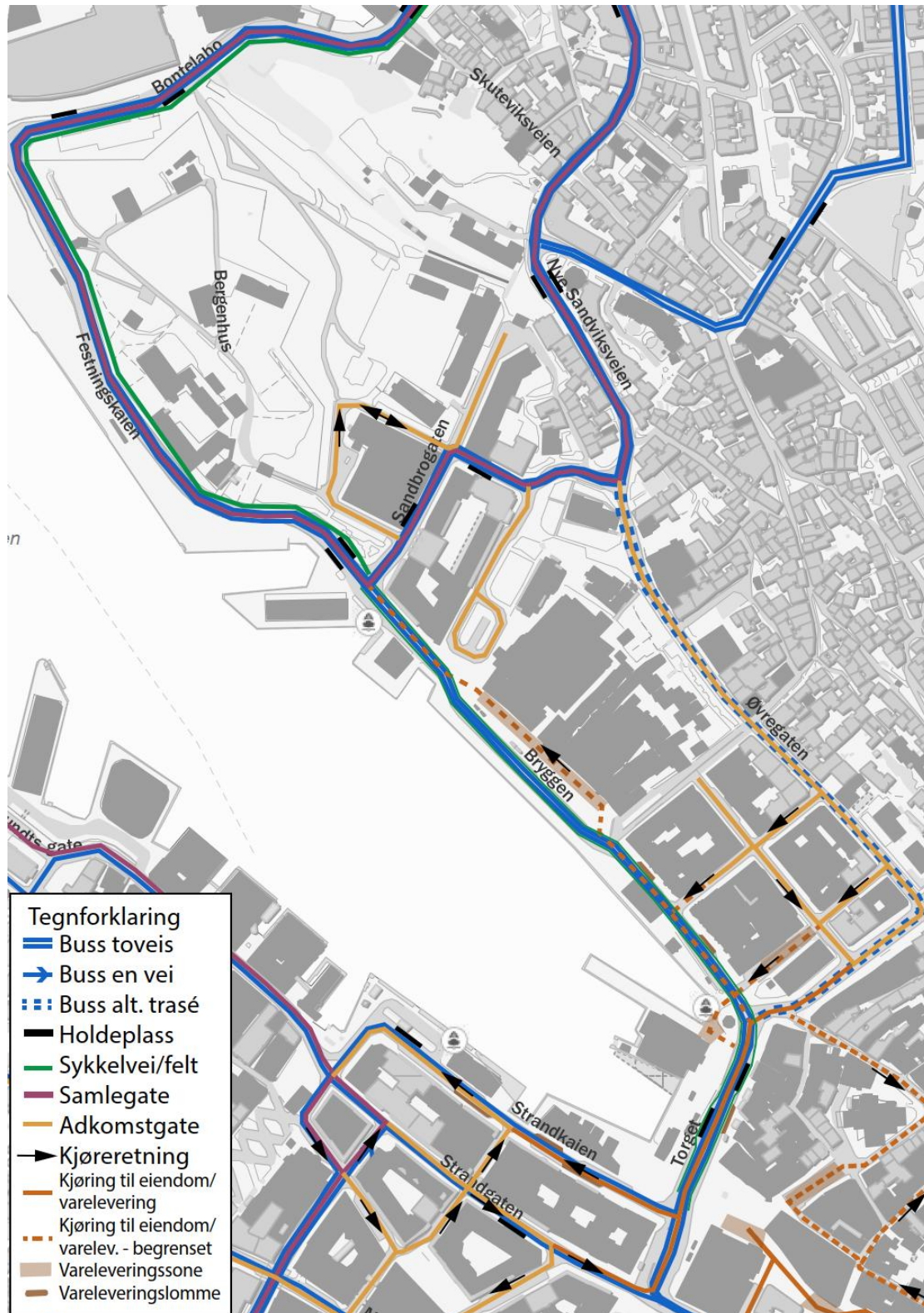


Figure 3-15: Driving patterns for different road user groups as assumed in the plan.

4 Identification and evaluation of impacts

The current management plan [14] highlights the following challenges regarding possible impact on OUV. Some of the challenges are left out of this report as they are not deemed relevant to the proposed action. The whole list can be read in the management plan.

- **Subsidence damage and ground conditions**
 - *Ensure the condition of the cultural layers in front of Bryggen – especially those located towards the modern quay*
 - *Clarify the groundwater situation and good storm water management in the marginal zone of Bryggen*
 - *There are no non-return valves on parts of the front area at Bryggen*
 - *Clarification of effects related to climate change, and an assessment of whether implemented measures have the desired effect*
 - *Lack of investigations of the source value of the post-Reformation cultural layers*
- **Water and sewage**
 - *Older pipe networks need replacement*
 - *Procurement and operation of pumps for stormwater management is lacking*
- **Vågen and the harbour**
 - *Ensure that the use safeguards the World Heritage values*
 - *Ensure that necessary installations and upgrades are adapted to the World Heritage values*
- **Future sea level, flooding and extreme weather**
 - *Long-term measures related to sea level rise*
 - *Spring tide and resulting flooding of Dreggskaien and Bryggen*
 - *Expected increase in precipitation levels entails challenges for gutters, stormwater management in general*
- **Urban development**
- **Traffic situation**
 - *Ensure that traffic planning is based on the challenges of the World Heritage Site Bryggen in order to contribute to the preservation of the World Heritage values*
 - *Excessive traffic pressure in the area*
 - *Existing and planned traffic systems have a barrier effect on the World Heritage*
 - *Pressure from tourism creates traffic challenges during the summer season*
 - *To ensure good accessibility*
 - *Strengthen the integration of public administration and World Heritage management that ensures that the World Heritage values are taken into account and safeguarded*
 - *An overall plan for public administration in the area that affects the World Heritage values and supporting values*
- **Visitors**
 - *Large amounts of tourists*
 - *Great dependence on tourism for businesses and other stakeholders at Bryggen*

Tool 2 – identifying potential impacts

As a continuation of Tool 1 (identifying values and attributes), the purpose of tool 2 is to break down the proposed action in elements that have the potential to cause impact. Firstly, the impacts are identified and then they are explained as a prerequisite to evaluate them in Tool 3.

Tool 3 – evaluation potential impacts

The purpose of the tool presented by UNESCO in its guidance is to illustrate a structured, step-by-step approach to evaluating impacts. The evaluation should be understood as a form of risk assessment,

including a worst-case scenario analysis of how potential impacts may result in positive or negative effects, taking into account their likelihood, duration, frequency, and reversibility.

The evaluation is not intended to function as a comparative assessment of alternative solutions. Rather, it serves as an analytical tool within the assessment process, designed to identify and highlight those impacts that require particular attention, mitigation, and management throughout the project lifecycle.

Result from the evaluation of impacts (Tool 2 + tool 3)

The evaluation undertaken in Tools 2 and 3 identifies the types of impacts that have the potential to result in neutral, moderate, or major effects. In general, minor to moderate positive impacts are associated with visual and functional improvements, including the consolidation of traffic functions, reductions in traffic volumes, and the removal of visual and functional barriers. Positive effects are also linked to measures that contribute to a wider spatial distribution of visitors, thereby reducing pressure on specific areas.

At the same time, minor to moderate negative impacts may arise from potential changes in groundwater conditions and from more substantial modifications to traffic patterns and road infrastructure. The most significant adverse effects are associated with the risk of alterations to groundwater conditions, which may result in severe and potentially irreversible impacts on archaeological deposits, building foundations, and consequently the structural integrity of existing buildings.

These potential impacts are primarily linked to the tunnel alignment behind Bryggen, the tunnel portal at Heggebakken, and the proposed underground station at Sverresborg, including a potential turning facility for the light rail system. In addition, impacts may arise from the upgrading and relocation of underground infrastructure throughout the city centre.

4.1 Impact assessment

The evaluations done in Tools 2 and 3 are used as a basis for assessing the impact of the proposed alternatives and what the assessment will focus on. The assessment is based on the proposed alternatives with several changes and mitigation measures implemented throughout the project, this is addressed in chapter 5. The focus of the KUVA consultant and the recommendations given has been on how the project can improve the world heritage property and the surrounding area. The alternative that is assessed is a result of the project phase and the internal alternative assessment referenced to in chapter 1.

Table 4-1: A list with the attributes and supporting attributes that is part of the impact assessment.

Value	Attribute
Hanseatic heritage	Existing buildings (tangible)
	Archaeological deposits (tangible) – inside of border
Historic townscape and historic trading port	Supporting attribute - Compact medieval urban structures (tangible)
	Supporting attribute - Historic harbour district (tangible)
	Supporting attribute - Archaeological deposits (tangible) – outside of border
Contemporary urban cityscape	The old wharf and 62 buildings of former township (tangible)
	Supporting attribute - Historic Wooden city (tangible)
	The objective of preserving Bryggen (intangible)

4.1.1 Attribute – Existing buildings (tangible) and Archaeological deposits (tangible) – Impact assessment

The attributes contain the totality of existing buildings at Bryggen and Finnegården and the archaeological deposits inside the world heritage property. As these are closely linked it is difficult to separate them. The building complex consists of Nordre Bugård, Søndre Bugård, Nordre Bredsgård, Søndre Bredsgård, Enhjørningsgården, Nord Svendsgården, Søndre Svendsgården, Jacobsfjorden, Bellgården, Nordre Holmedalsgård and Finnegård. Included are also the bolverk foundations and all other building structures that are inside the world heritage property.

The attribute “**Archaeological deposits**” contains archaeological deposits inside of the borders of the world heritage property. The archaeological deposits outside of the borders function as a sustaining value and give the deposits inside of the borders a greater context. The medieval archaeological deposits called Middelalderbyen Bergen (id 89049) is characterized as a sustaining value in the Bryggen management plan [14].

Value level	Value	Attribute	Assessed objects and elements
OUV	Hanseatic Heritage	Existing buildings (tangible)	Bugården (id 87126)
			Bredsgården (id 86010)
			Enhjørningsgården (id 87134)
			Svendsgården (id 87166)
			Jacobsfjorden (id 87139)
			Bellgården (id 90851)
			Finnegården (id 87135)
			Bryggen Foundations (bolverk)
	Hanseatic Heritage	Archaeological deposits (tangible)	Middelalderbyen Bergen (id 89049) inside of the World Heritage property
			Verdensarven Bryggen i Bergen (id K5)

The objects in the list above can be affected by:

- Tunnel behind Bryggen, underground stop and turning arrangement behind Sverresborg
- Restructuring of infrastructure
- Traffic congestion
- Establishment of a public transport corridor with bidirectional cycle lanes
- Lighting arrangements

There is no regulation for measures that come into direct conflict with existing buildings, but the tunnel and underground stop/station with other infrastructure measures may, on the other hand, lead to indirect effects via hydrogeological changes.

Tunnel behind Bryggen, underground stop and turning arrangement behind Sverresborg

The tunnel will run from Heggebakken in the south to Sjøgaten in the north. The stop is designed as a underground stop with a central platform of approx. elevation -1. An exit to Sandbrogaten and Fredens Bolig will also be established. In the northern part of the Sverresborg stop, there are plans for a turning arrangement under Sverresborg (se figure 4-1, figure 4-2).

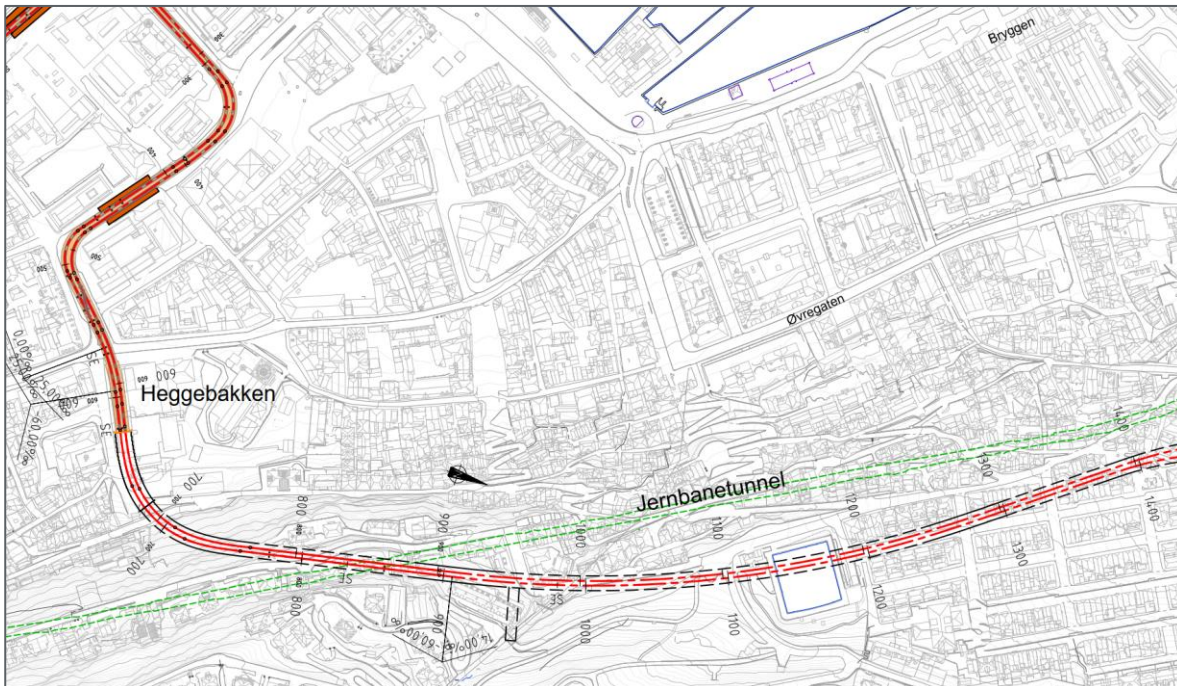


Figure 4-1: Southern part of the tunnel, with the entrance from Heggebakken, and the crossing under the railway tunnel.

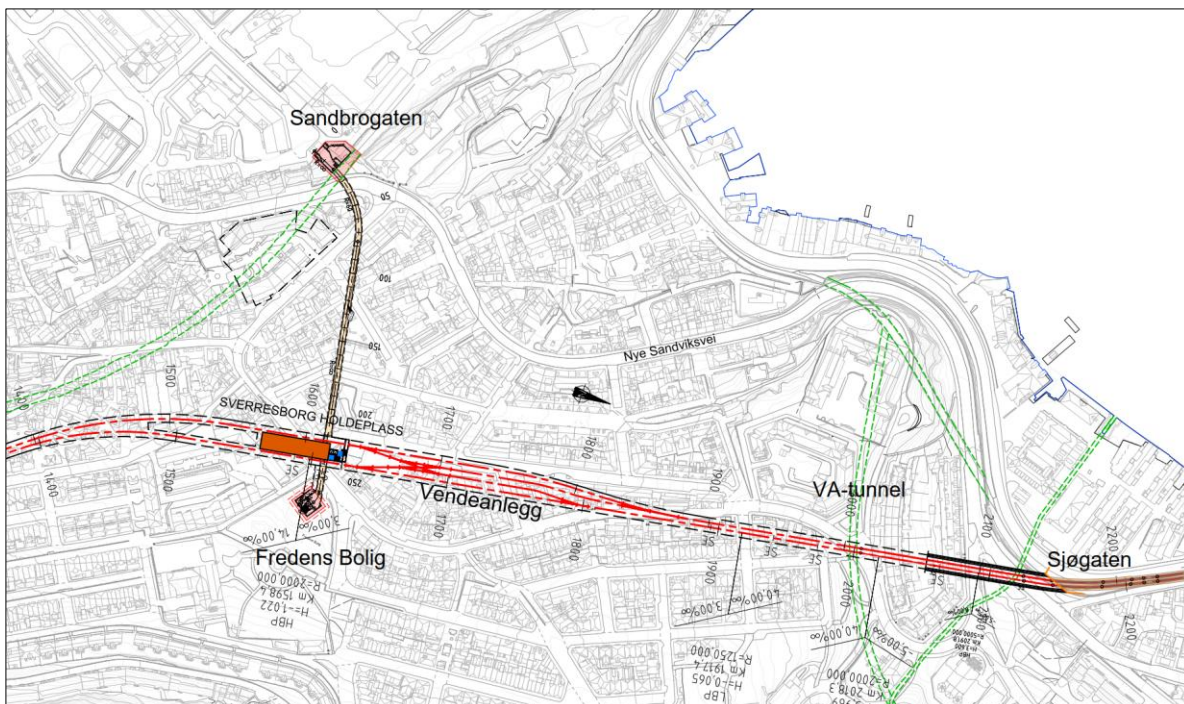


Figure 4-2: Northern part of the tunnel, which shows the underground stop with accesses and turning facilities, as well as an outlet into Sjøgaten, at Slakthustomten.



Figure 4-3: Section seen to the southwest. Much of the buildings and terrain are excluded to show the tunnel system. The Skansen tunnel is marked in yellow and is not part of the study. The light rail tunnel is marked in orange. Bryggen and Finnegården are marked in pink and marked with a white arrow.

A number of investigations have been carried out throughout the city and from the Skansen tunnel and into the mountain. The results are included in a groundwater model. The groundwater flow is from higher areas in the east and northeast towards Vågen and Vågsbunnen in the west. In the areas that are close to Vågen, the groundwater level is affected by high and low tide.

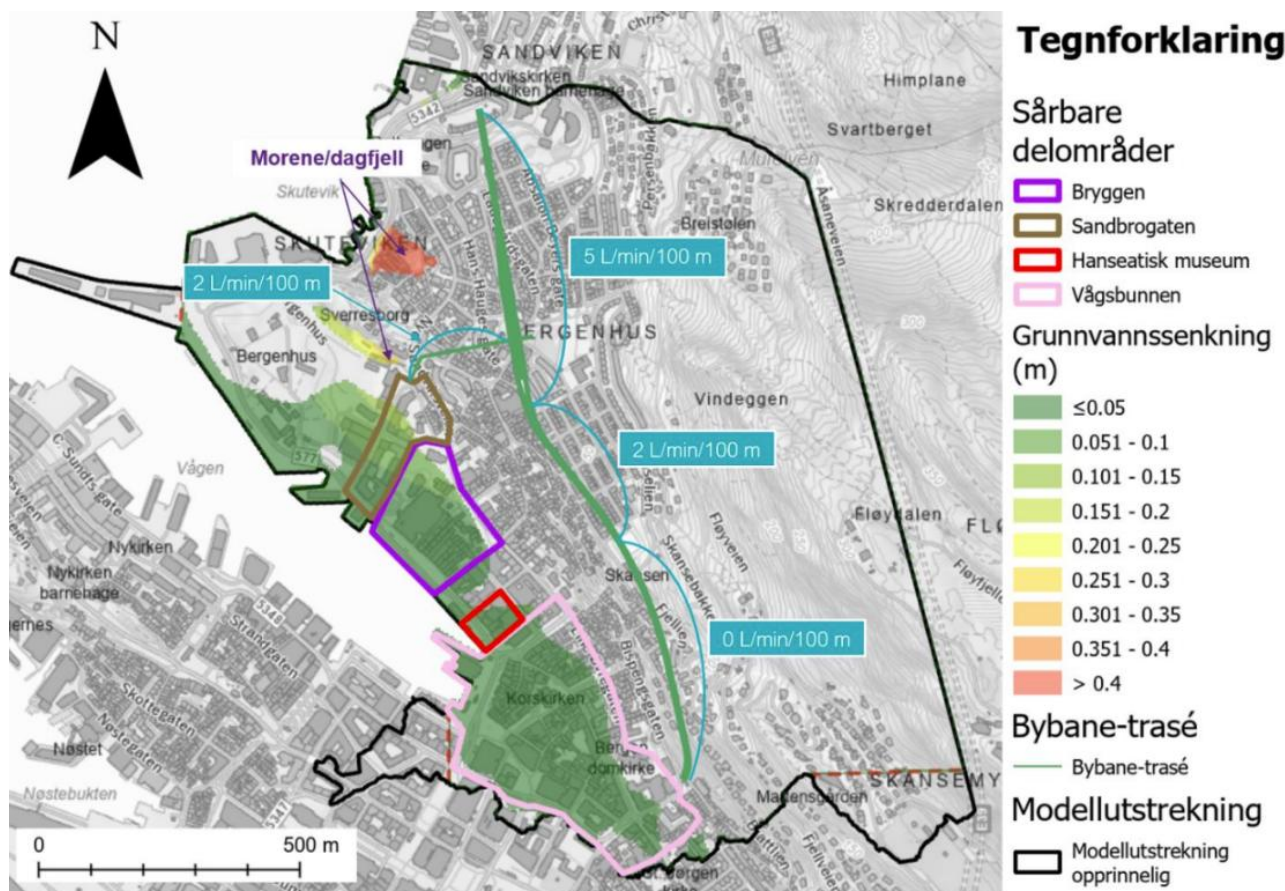


Figure 4-4: Results from the numerical groundwater model showing the predicted groundwater drawdown in superficial deposits for a scenario assuming inflow rates of 0 L/min/100 m (rail tunnel south of Skansedammen), 2 L/min/100 m (rail tunnel between Skansedammen and Sverresborg Station, as well as construction and access tunnels), and 5 L/min/100 m (station cavern, turning facility, and rail tunnel north of the turning arrangement). Areas shown without colour indicate locations where the current groundwater level is within bedrock, meaning that the superficial deposits are already drained and are therefore not susceptible to settlement caused by groundwater lowering.

Extensive pre-excavation grouting will be necessary to reduce the water ingress to tunnels. It is assumed that undrained waterproof concrete lining of sections of the tunnel (see figure 4-4) may be required to comply with the requirement from the Directorate for Cultural Heritage (Riksantikvaren) that the project shall not cause any groundwater drawdown at Bryggen and Finnegården. When modelling with no water leakage into the tunnel between Heggebakken and Skansedammen, groundwater drawdown at Bryggen is estimated to be less than 5 cm at the front area of Bryggen, while a drawdown of up to 10 cm is estimated in the rear parts of the Bryggen area.

There is uncertainty associated with groundwater lowering at this point, and it is therefore important to point out that it may be negligible. Due to the uncertainty in the calculations, it can also be higher and significant. The modeling indicates that the tunnel should be constructed with strict sealing requirements (see table 4-2).

Strict mitigation measures must likely be designed and established during the construction phase. This can be, for example, local infiltration or other solutions that maintain groundwater levels and pore pressure. The assessment is based on the assumption that the measure is not possible to implement without mitigating measures that ensure the groundwater level under existing buildings.

Table 4-2: Preliminary sealing requirements for tunnels.

Tunnel construction	Pel nr.	Preliminary sealing requirements [litre/minute/100 m tunnel]
Rail tunnel (from Heggebakken)	680-1200	< 1
Rail tunnel (south of the stop)	1200-1500	2
Sverresborg stop and the turning arrangement	1500-1850	5
Access/construction tunnel, shaft	-	2
Rail tunnel (north of turning arrangement)	1850-2055	5

The groundwater model indicates a theoretical possibility that groundwater levels may be lowered, with a risk that this change over time could lead to settlement damage to existing buildings. It must be noted that the steady state model estimates average groundwater lowering over time that is much smaller than the natural groundwater level fluctuations. Additionally, other construction works, submersible pumps in basements, etc. may affect the groundwater levels. Thus, it will be difficult and time consuming to evaluate whether the tunnel has affected the groundwater permanently, within the expected range of groundwater lowering. This represents a source of uncertainty in the project. Based on the knowledge of hydrogeological conditions made available through the assignment, the risk of settlement damage is assumed manageable through detailed design and mitigating measures as mentioned above. The residual risk will be difficult to eliminate entirely without reservations; this reflects the assessed consequence which according to the method must be strict.

Impact: **Degraded**

Restructuring of infrastructure

Along Torget, Vetrilidsallmenningen, and further north towards Bryggen, a number of excavation works will be carried out as a result of infrastructure relocation (see figure 4-5). In Vetrilidsallmenningen, extensive excavation works of up to 3 metres will take place just south of Finnegården. Along Bryggen, excavations of up to 1 metre will be required due to private service connections, while at the northern end of Bryggen, west of the SAS Hotel, excavations of up to 2 metres will be necessary. From Nikolaikirkeallmenningen and Dreggsallmenningen, stormwater pipelines will be established towards Vågen, requiring excavations of up to 2.5 metres. A similar installation will be established approximately in the middle of Bryggen, some distance from the buildings, with a comparable excavation depth. Outside the corner of Bryggen 15, point excavations of up to 3 metres will be carried out. During the construction phase, it will be important as a mitigation measure to carry out excavation in wet trenches, to use prefabricated structures, and to apply low-permeability materials around the infrastructure. Reference is made to the framework plan for water and wastewater (VA) for further details (RA-00-005).

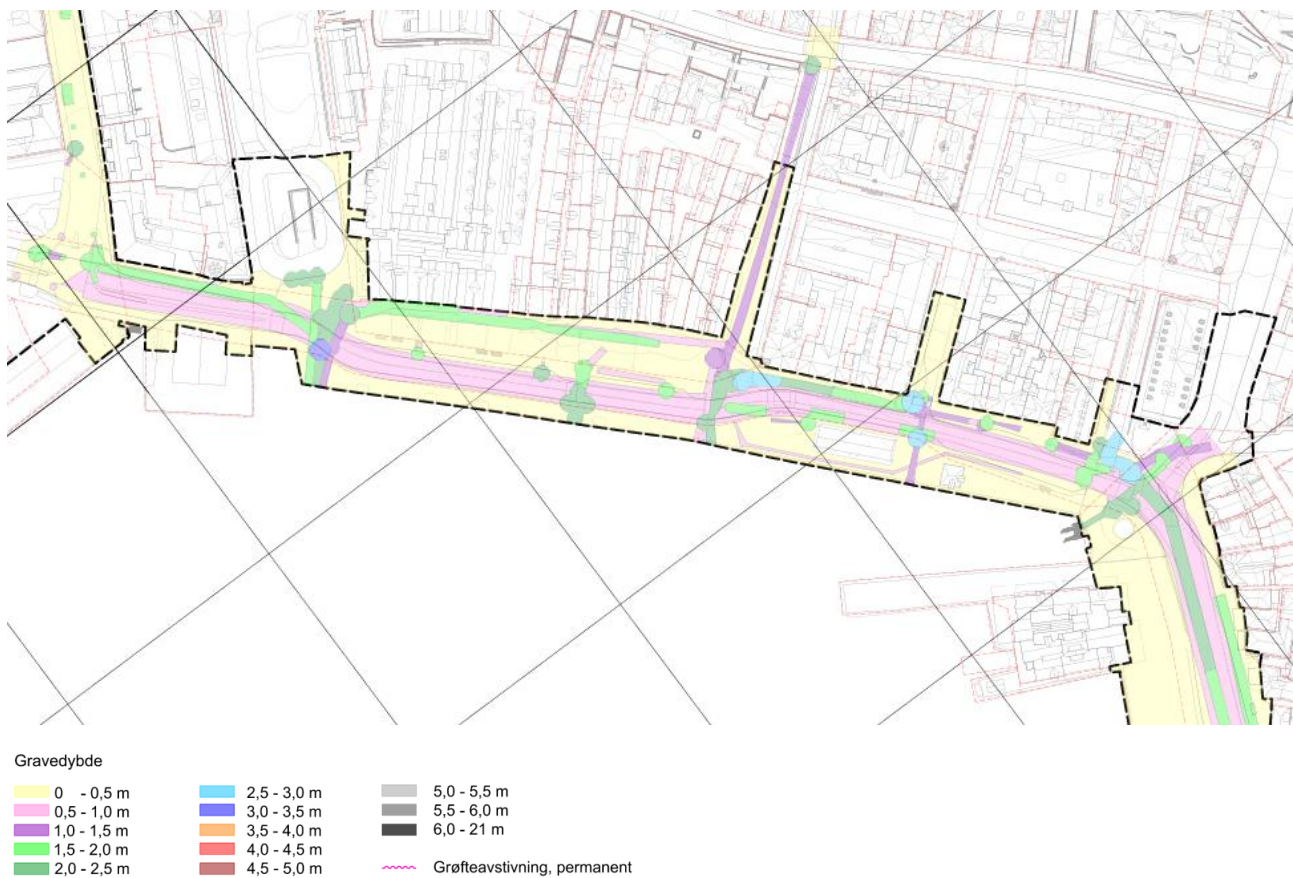


Figure 4-5: Excavation depth overview.

A plan must be in place for monitoring and securing the groundwater level and pore pressure before, during and after the construction phase. If mitigation measures are implemented, the rehabilitation of infrastructure works is considered to pose a low risk of groundwater lowering. In the management plan replacing VA infrastructure is considered to be a positive measure.

Impact: Insignificant change – **Positive**

Traffic congestion

The City Centre Traffic Plan and the proposed zoning plan will result in a substantial reduction in overall traffic volumes compared to the current situation. Regardless of the light rail (Bybanen) placed in a tunnel, traffic along Bryggen and Finnegården will be significantly reduced, particularly for private cars. While the relative proportion of heavy traffic (buses) may increase under the new traffic pattern, the absolute volume will be significantly lower than today estimated at approximately half of current levels. On this basis, the future traffic situation is not expected to generate vibrations or other impacts that could adversely affect the preservation conditions of archaeological cultural deposits. The effect is therefore assessed as positive. It should be emphasised that the majority of the traffic reduction derives from the City Centre Traffic Plan rather than the light rail project alone. Without the light rail, projected traffic volumes along Bryggen towards 2050 would be somewhat higher, but still significantly lower than in the present situation.

Impact: **Slightly positive**

Establishment of public transportation corridor with bidirectional cycle lanes

The establishment of a public transport corridor with bidirectional cycle lanes is assessed not to affect groundwater conditions and, consequently, not to have any indirect impact on the archaeological cultural deposits beneath Bryggen and Finnegården. The road works will require excavation to a depth of approximately 0.5–1.0 metres. At this depth, no adverse effects on groundwater conditions or conflicts with archaeological cultural layers within the World Heritage property are anticipated.

Impact: Insignificant change

Lighting arrangements

The lighting poles closest to the Bryggen buildings will be installed on shallow foundations. Taller lighting masts will require deeper foundations but will be positioned along the outer edge of the traffic area and cycle lanes. The installation of lighting mast foundations is not expected to result in any conflict with legally protected archaeological deposits within the boundaries of the World Heritage property.

Impact: Insignificant change

Impact assessment

Functional impact

- ✓ Significantly reduced traffic along Bryggen will result in an improved situation for visitors and noise pollution.
- ✓ Upgrading and maintenance of water and wastewater (VA) infrastructure is considered to be a positive change.

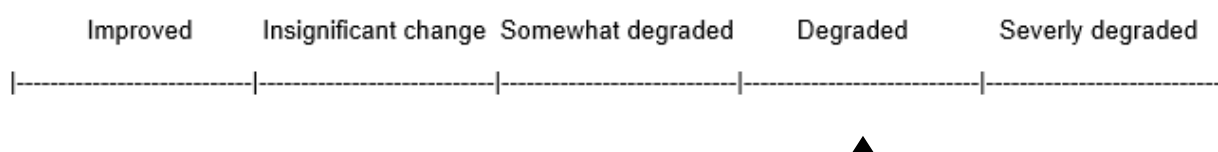
Visual impact

- ✓ The transformation of the quay area in front of Bryggen will result in a coherent and unified surface treatment.

Structural impact

- The establishment of a public transport corridor and bidirectional cycle lanes will not affect the groundwater levels and the structural integrity of the buildings.
- The lighting arrangements will not affect the groundwater level or cause structural impact on the buildings.
- ✓ A groundwater drawdown (of up to 10 cm) are based on uncertain calculations. It is also possible that the measure will not result in any change in groundwater levels.
- There is a risk that the measures may, over time, lead to adverse developments that are not currently identified or understood.

Groundwater modelling indicates that the planned tunnel has the potential to create groundwater drawdown at Bryggen of up to 10 cm and Finnegården of up to 5 cm. The calculations are made with a degree of uncertainty which reflects the “degraded” impact assessment. There is therefore a likelihood that the measure may, over time, lead to settlement damage or other physical effects that are not currently fully understood. The assessment is made on the basis that a residual risk will remain. The residual risk has to be assessed negatively according to the method. The impact is assessed as “**degraded**”.



Value	Attribute	Impact	Degree of consequence
Hanseatic Heritage	Existing buildings (tangible)	"Degraded"	Large negative consequence (3-)
	Archaeological deposits (tangible)		

Tabell 4-3: Basis for impact assessment.

Category	Improved	Insignificant	Somewhat degraded	Degraded	Severely degraded
Direct conflict				x	
Proximity effects				x	
Visual effects		x			
Design		x			
Further use of the cultural environment			x		

4.1.2 Supporting attribute – Compact Medieval urban structures (tangible) – Impact assessment

The attribute contains traces of the medieval urban structures still visible (and invisible) in the city today. Bergen's historic city centre is viewed as a sustaining value. Also, 16th century structures as Muren (id 86012), Gamle Rådhus (id 87132) and the Rosenkrantz tower (id 87123-3) has an important historic connection to the attempts by the authorities to confine the Hanseatic dominance in the town and ultimately move the city's market. This was an act that laid the foundations for the town's subsequent development. The Maria church was called "the German church" after the Hanseatic office in 1408 took ownership of it. The objects listed below are traces of the buildings, ruins and churches from the medieval period that is important for understanding the layout of the city in the corresponding period as the Hanseatic leagues dominance in the city. The street structure and the medieval elements are supporting values to the world heritage property.

Value level	Value	Supporting Attribute	Assessed objects and elements
OUV	Historic townscape and historic trading port	Compact medieval urban structures (tangible)	Bergen domkirke (id 83876) (outside of property)
			Katarina hospitalet (outside of property)
			Mariakirken (outside of property)
			Øvregaten (outside of property)
			Nikolaikirkeallmenningen (outside of property)
			Kong Oscarsgate (outside of property)
			Domkirkegaten (outside of property)
			Muren, Rådhuset og Holmen (outside of property)
			Allehelgenskirke/-hospital (outside of property)

Value level	Value	Supporting Attribute	Assessed objects and elements
			Rosenkrantzårnet (id 87123-3, outside of property)

The objects listed above may be affected by:

- Rail alignment and tunnel portal at Heggebakken
- Cycle route and public transport corridor
- Changes in traffic

Rail alignment and tunnel portal at Heggebakken

The rail alignment is, in general, not in direct physical conflict with medieval structures included in the assessment of the attribute. However, extensive excavation is planned in Allehelgens gate, which may conflict with the remains of Allehelgens kirke or the associated hospital. This site is not directly linked to the Hanseatic activity, in contrast to Katarina hospitalet. Subsurface structures have previously been identified in Allehelgens gate, interpreted as possible remains of the churchyard associated with Allehelgens kirke. Knowledge of this site and any surviving subsurface remains is limited.

In Kong Oscars gate and Heggebakken, the tunnel portal, rail alignment, and associated infrastructure measures will conflict with a documented masonry structure in the ground. This structure is continuous and is likely associated with the Fransiskanerklosteret, formerly located near the Cathedral (Bergen Domkirke ID 83876). The wall is approximately 1.5 metres wide, has been documented over a length of 8 metres, and may occur at a depth of less than one metre below current street level in Kong Oscars gate. Knowledge of the corresponding structure in Heggebakken is very limited, as it was only recorded through drawings and photographs in 1972.

It is reasonable to assume that both structures are more closely associated with a garden installation than with the monastery buildings themselves, which were located closer to the Cathedral. Nevertheless, such subsurface medieval remains are automatically protected and represent highly valuable cultural heritage assets that would be lost if the measure is implemented. The area also has potential for additional medieval, legally protected archaeological deposits beyond the identified wall, although much of this may have been disturbed or removed due to later construction activity and foundations related to the Cathedral School.

During the operational phase, the tunnel portal and rail corridor may create a degree of physical and visual barrier effect in Kong Oscars gate and towards the Cathedral. However, this impact is assessed as insignificant due to distance and the general development of the city. The primary conflict arises during the construction phase, when establishment works are expected to generate notable levels of noise and dust.

Poles for the overhead contact line system, signalling equipment, and signage will result in a minor visual impact in the vicinity of Gamle Rådhus towards Vågsallmenningen (see figure 4-6).

Impact: **Degraded**

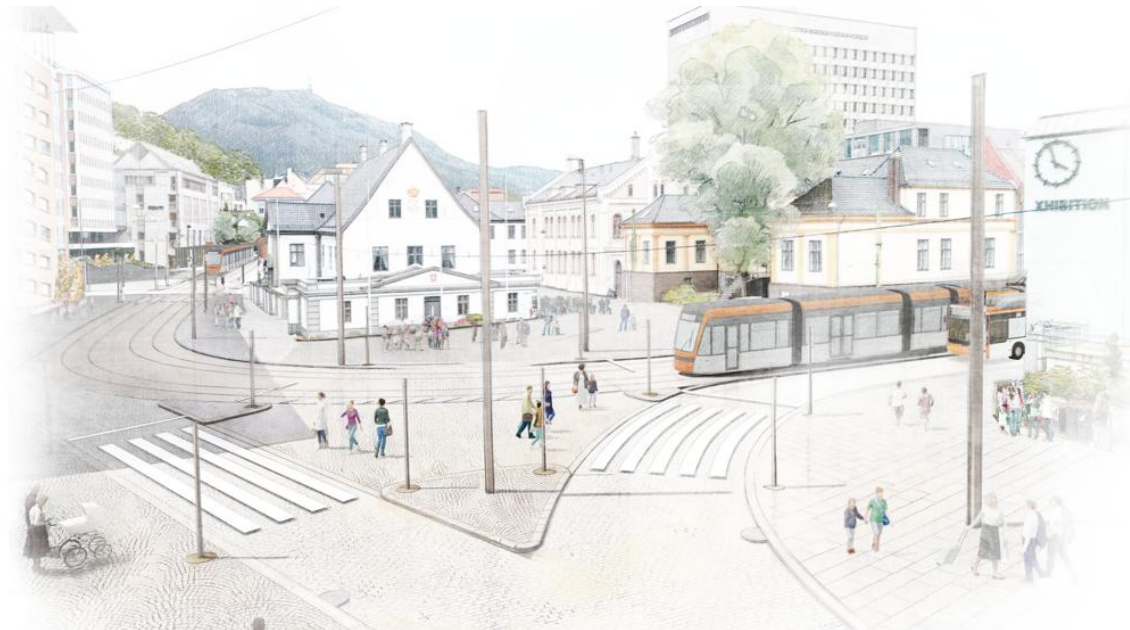


Figure 4-6: Illustration showing the future situation in the area of Christies gate, Småstrandgaten and Allehelgens gate, viewed from the Old Town Hall towards the north Situation near the old townhouse.

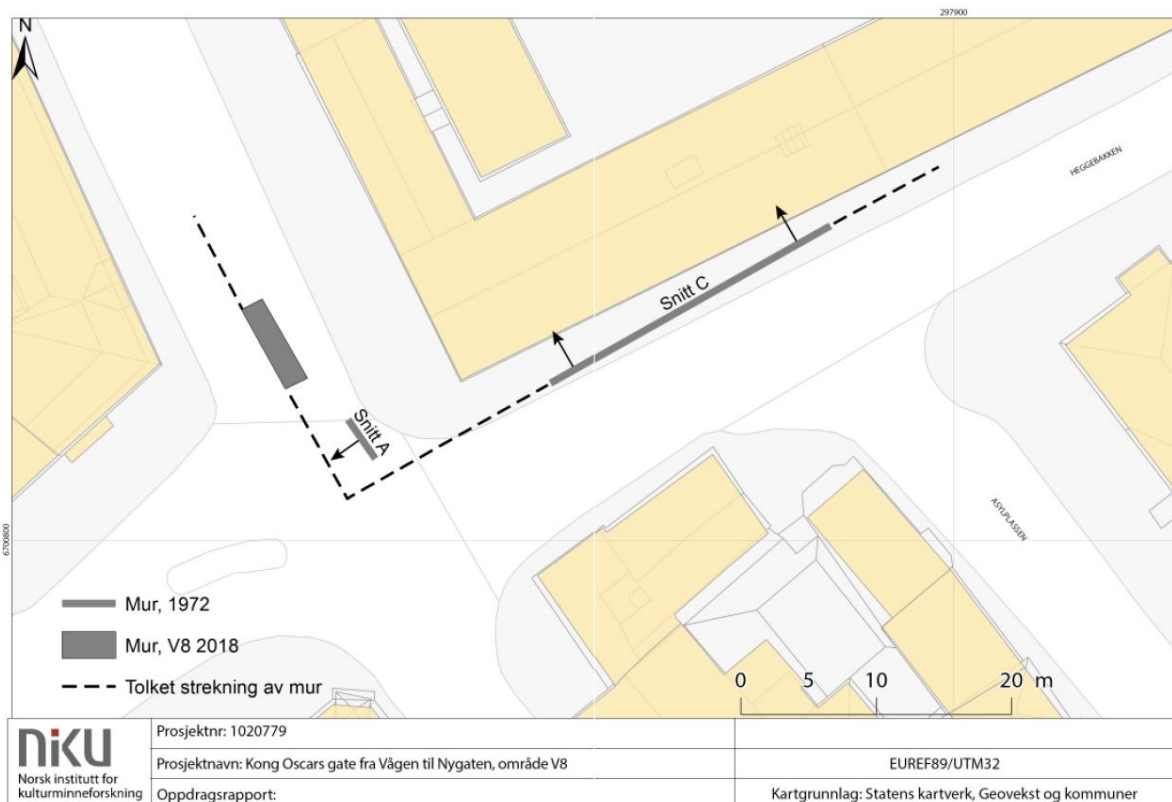


Figure 4-7: The section of the wall documented in 2018 should be interpreted in conjunction with observations from 1972. While the walls were not fully excavated at that time, one face of the structure was recorded. The arrows indicate which side of the wall was observed, with the wall's exposed surface oriented in the direction of the arrows. Additional wall remains have also been observed, which may be associated with those illustrated in the figure. Kilde: [28]

Cycle route, public transport corridor and light rail alignment

The bidirectional cycle lanes and public transport corridor established from Lower Torgallmenningen towards Torget are planned along an axis where Gamle Rådhus (the Old Town Hall), Muren, and Bryggen form key elements. The spatial relationship is currently most clearly expressed between Gamle Rådhus and Holmen/Bryggen, with an important sightline along Vågsallmenningen. The introduction of cycle lanes and the rail alignment will add new elements to the streetscape; however, these are not expected to create significant barrier effects. Poles for the overhead contact line system, signalling equipment, and signage will result in a minor visual impact in the vicinity of Gamle Rådhus towards Vågsallmenningen (see figure 4-6).

Impact: Insignificant change – insignificant change

Changes in traffic

The introduction of a light rail alignment will constitute a new element in Christies gate, Allehelgens gate, Nygaten, and parts of Kong Oscars gate. These streets are currently open to two-way traffic for both private vehicles and public transport. At present, bus routes run through Allehelgens gate and Nygaten in both directions to and from Kalfaret. Under the proposed configuration, buses travelling from Kalfaret towards the city centre will operate within the light rail corridor, while buses travelling from the city centre towards Kalfaret will be rerouted via Kaigaten, Strømgaten, and Kong Oscars gate towards Kalfarveien.

Kong Oscars gate is currently one-way between Domkirkegaten and Nygaten/Heggebakken but will be reconfigured to include two lanes alongside Bergen Cathedral School and Bergen Cathedral, allowing traffic to move southwest along Domkirkegaten. Heggebakken and the adjacent wooden building environment will maintain access alongside the tunnel portal in Heggebakken. Traffic modelling indicates that by 2050, overall traffic volumes will be significantly reduced, mainly because of the City Centre Traffic Plan. The proposed action has insignificant differences to the reference situation in this area.

However, the reorganisation of traffic flow in Kong Oscars gate is assessed to negatively affect the experience of the street corridor and the space in front of the Cathedral compared to the present situation. As a result of the modified traffic system, vehicles will be required to turn southwest via Domkirkegaten, altering current movement patterns.

Øvregaten is a historic route and a key component of the cultural environment in the city centre. The street forms part of the supporting values of the World Heritage property, with Mariakirken being particularly sensitive to nearby interventions. Øvregaten will be affected by traffic changes resulting from the possible closure of Bryggen to vehicular traffic if Fløyfjellstunnelen is closed. Traffic modelling indicates a notable reduction in average daily traffic (AADT) in 2050, which represents an overall improvement. Compared with the proposed action the difference in traffic is insignificant. For Øvregaten in general, and particularly for the historic garden areas between Øvregaten and the Bryggen buildings, reduced traffic volumes will enhance experiential quality and reduce impacts from noise and road dust.

To the west of Øvregaten, northwest of the entrance to Mariakirken, the local environment will largely remain unchanged, although traffic patterns will be altered. Traffic modelling indicates a significant reduction compared to current conditions, largely attributable to the City Centre Traffic Plan rather than the zoning proposal itself. However, the rerouting of bus services via Sandbrogaten and Øvre Dreggsallmenning towards Øvregaten will result in a slight increase in bus traffic past Mariakirken (see figure 4-8). Compared to the reference situation the increase at Mariakirken is insignificant.

Impact: **Somewhat degraded**

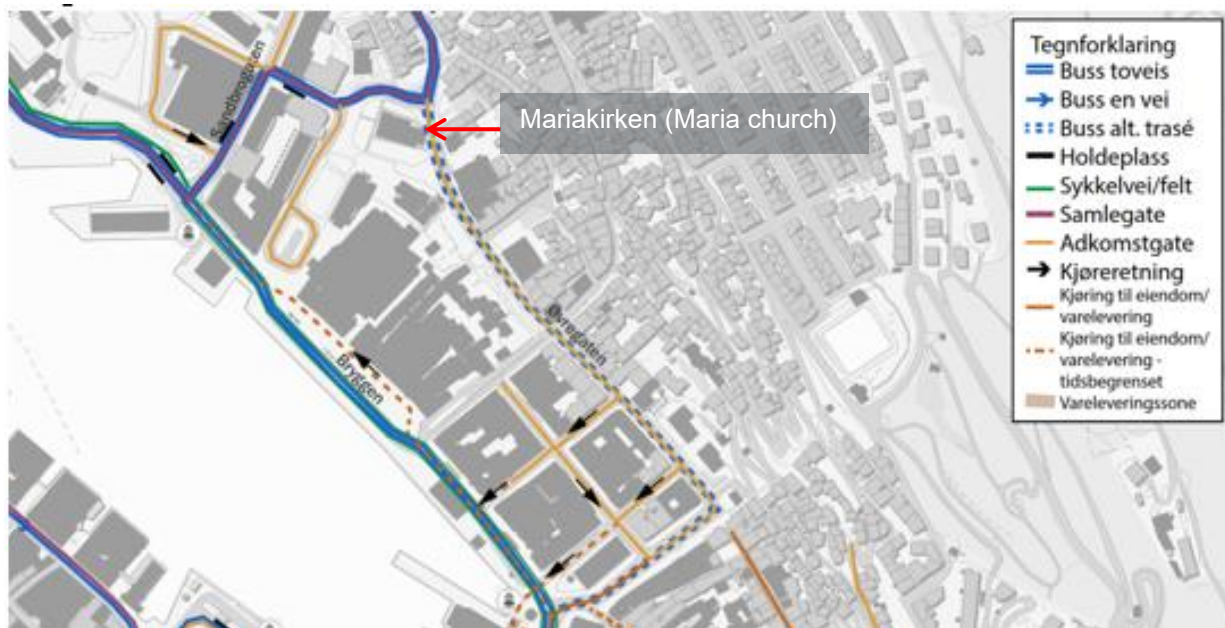


Figure 4-8: Traffic circulation patterns for different user groups around Torget and Bryggen as assumed in the proposed plan.

Impact assessment

Functional impact

- An increase in bus traffic along the northern side of Mariakirken is assessed as having a insignificant impact on the surrounding environment of the church site as it is very close to the reference situation.
- ✓ Traffic reorganisation will remove private car traffic from Nygaten and Allehelgens gate. This will be replaced by the light rail, introducing a new element to the urban environment; however, the overall reduction in traffic is assessed as positive for the area.
- ✓ The requirement for private vehicles to travel to Domkirken before turning onto Domkirkegaten is assessed as having a negative impact on the surrounding environment. The negative impact is not significant.

Visual impact

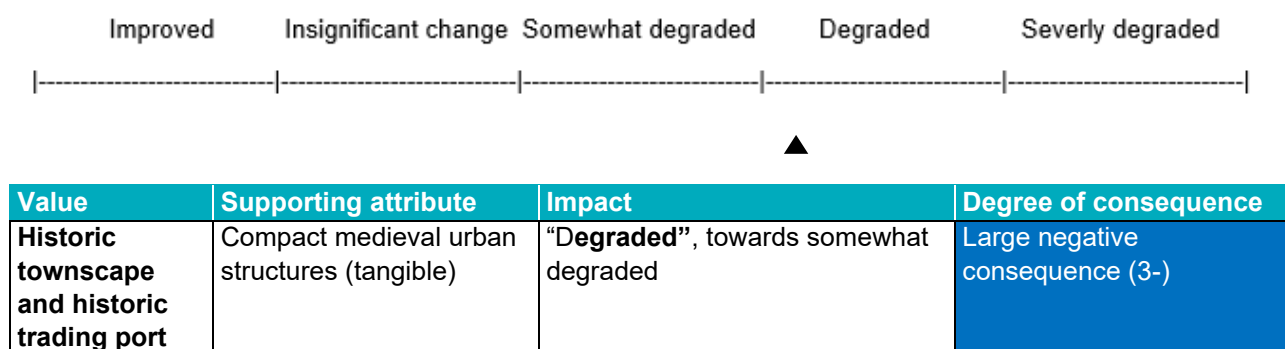
- The establishment of a public transport corridor with bidirectional cycle lanes is located within an important line of sight along Vågsallmenningen towards Vågen; however, it will not obstruct this view corridor. Bus stops at Torget are positioned so as not to interfere with this axis.
- ✓ There is some uncertainty regarding the reconstruction of the Cathedral School. The more recent buildings are to be demolished, but detailed planning has not yet been initiated, and therefore limited information is available on the future configuration. There is a strong intention for the school to remain in the area following completion of the tunnel, and sufficient space has been allocated in the zoning plan to accommodate this.
- ✓ Poles for the overhead contact line system in the vicinity of Gamle Rådhus will have a minor visual impact on the sightline along Vågsallmenningen, resulting in a slightly negative effect on this axis.

Structural impact

- ✓ The excavation works will be in conflict with medieval structures, including the underground wall in Kong Oscars gate and Heggebakken, as well as potential remains of Allehelgens Church or the associated hospital that may be present in Allehelgens gate.

The project will result in direct physical impacts on limited portions of the subsurface remains. However, the overall extent of impact is geographically restricted, and the legibility of urban structures, spatial relationships, and principal heritage features (including Domkirken and the historic street axes) will be retained. The medieval street pattern and associated subsurface deposits, while significant, are only partially legible in the current urban environment and are therefore less sensitive in terms of visual and experiential attributes, though they remain important for archaeological integrity.

On this basis, the impact is assessed as **«somewhat degraded»**, reflecting localised loss of archaeological integrity due to direct intervention, without a corresponding substantial effect on the overall integrity or authenticity of the World Heritage property.



Tabell 4-4 Basis for impact assessment.

Category	Improved	Insignificant	Somewhat degraded	Degraded	Severely degraded
Direct conflict			x		
Proximity effects			x		
Visual effects		x			
Design		x			
Further use of the cultural environment			x		

4.1.3 Supporting attribute – Historic harbour district (tangible) – Impact assessment

Bryggen is a historic harbour district on the west coast of Norway, and one of Northern Europe’s oldest port cities. The quay has evolved since the Middle Ages and continuously expanded to the current state. The city Centre surrounds the harbour which is still an active harbour within the historic environment.

Value level	Value	Supporting Attribute	Assessed objects and elements
OUV	Historic townscape and historic trading port	Historic harbour district (tangible)	Relationship between Bryggen, the quay and Vågen (id K5, area outside of property)
			Finnegården (id 87135, area outside of property)

The objects listed above may be affected by:

- Public transport corridor and bidirectional cycle lanes

Public transport corridor and bidirectional cycle lanes

Through the northern part of the city centre (from Torget to Skuteviken), a public transport corridor with bidirectional cycle lanes is proposed as part of the detailed zoning plan for the Torget–Skuteviken cycle route. In today's situation there is a broader transport corridor for private cars and public transport. Today's traffic area is included in the reference situation towards 2050. In general, the traffic area will be narrowed and more clearly defined compared to reference situation (see figure 4-9).

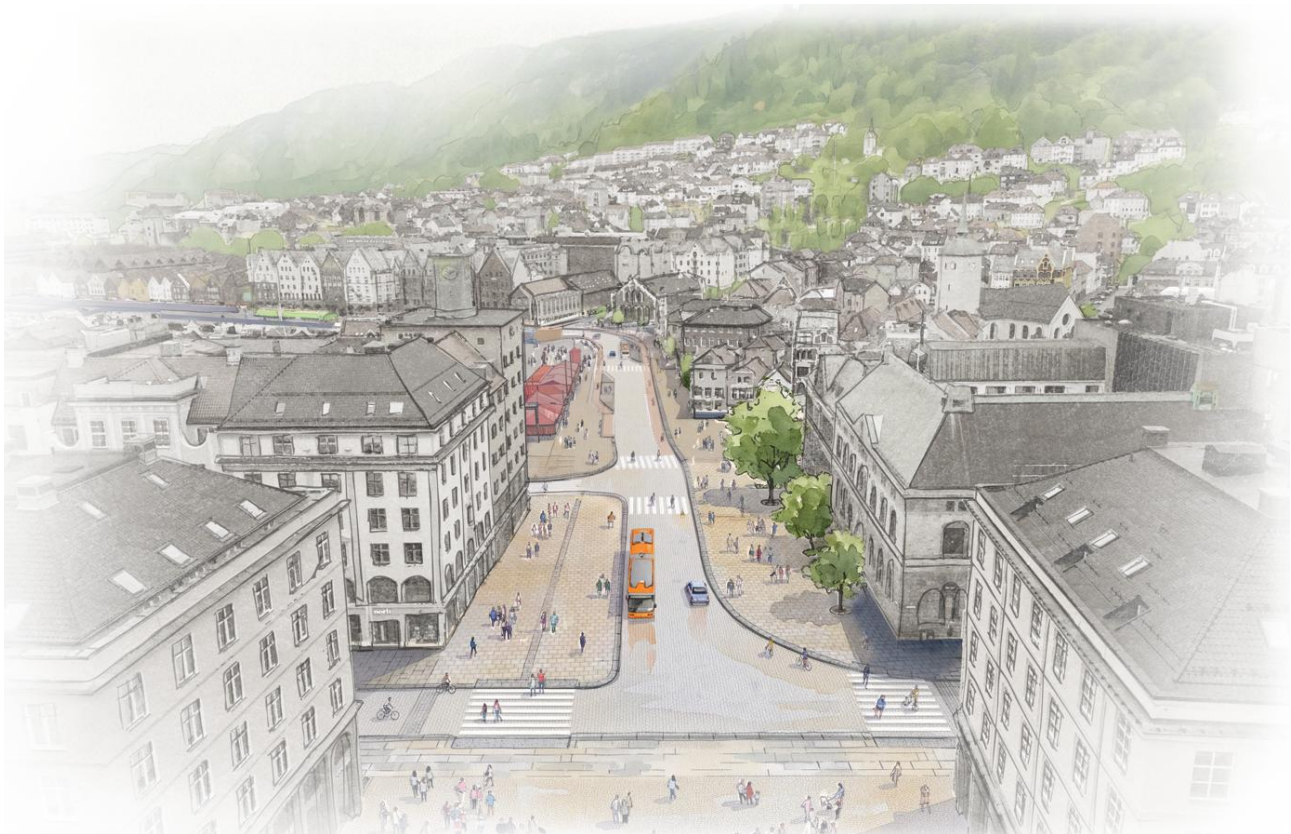


Figure 4-9: Illustration of future situation at Lower Torgallmenning av Torget.

The route runs along the northern side of Vågen, which forms a central component of Bergen's historic harbour landscape. Compared to the present situation, the traffic area at Finnegården will be positioned slightly closer to the building, resulting in a reduction of public space in front of the Hanseatic Museum. The current distance between the building and the carriageway is just under 8 metres, while the proposed configuration reduces this to approximately 5.5 metres.

This change will weaken the spatial and functional relationship between Finnegården, the quay, and Vågen, and will further constrain the forecourt area of the Hanseatic Museum. This is assessed as a negative impact

compared to the reference situation, as it reduces the legibility and experiential quality of a key component of the World Heritage environment (see figure 4-10, figure 4-11).



Figure 4-10: Future situation at Finnegården.

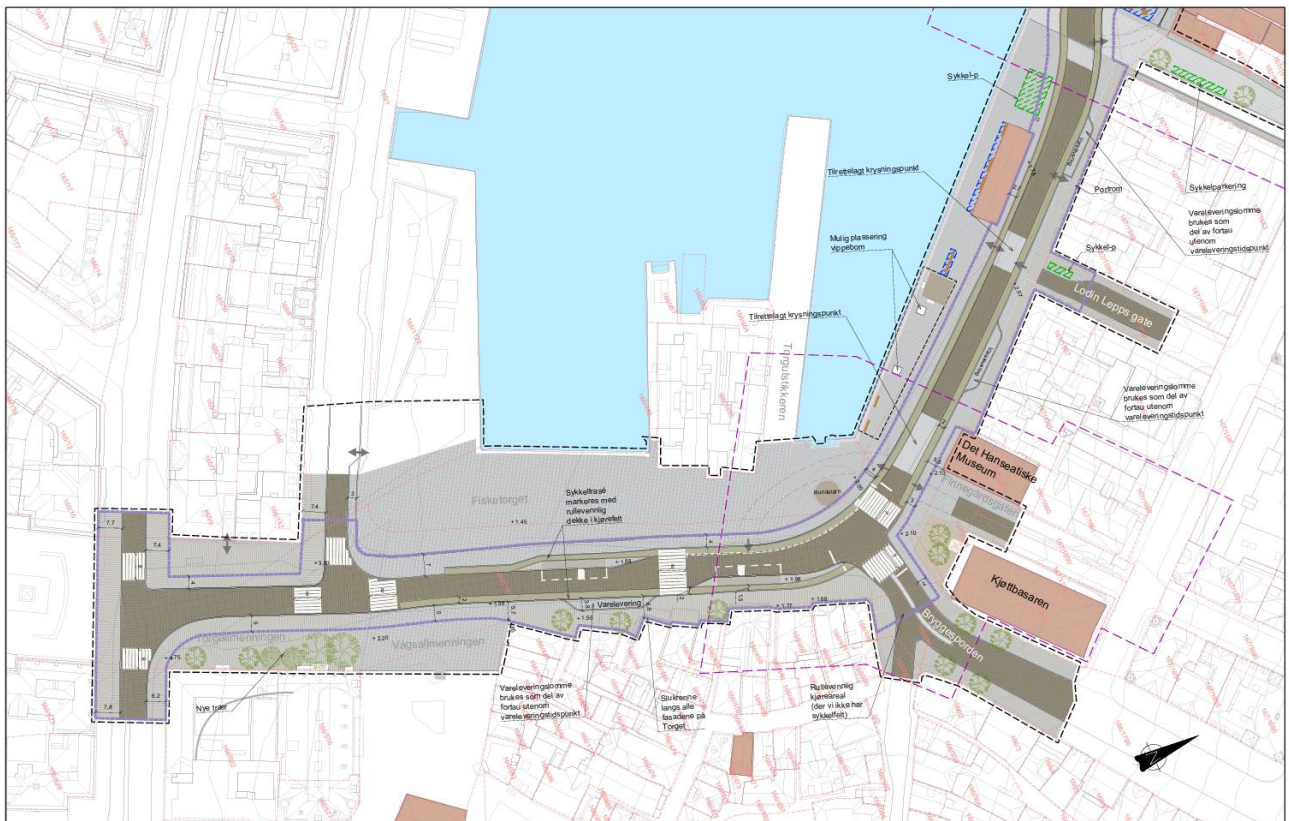


Figure 4-11: The spatial relationship between the urban spaces from Torgallmenningen to Bryggjesporden.

The building of a public transport corridor with bidirectional cycle lanes will introduce a new element along Torget, Murbryggen, and Bryggen. Although the overall traffic area will be somewhat narrower than in the reference situation, the provision of four lanes (bus traffic in both directions and cycle lanes in both directions), particularly in front of Bryggen and Finnegården, will create both a physical and visual barrier.

This barrier effect has the potential to somewhat disrupt the historical understanding of the area and weaken the relationship between the Bryggen buildings and Vågen. Although not to a large degree compared to the reference situation. The proposed layout may facilitate higher travel speeds for both buses and cyclists, independently of overall traffic volumes. This has the potential of reinforcing the barrier effect. This is assessed as a negative impact.

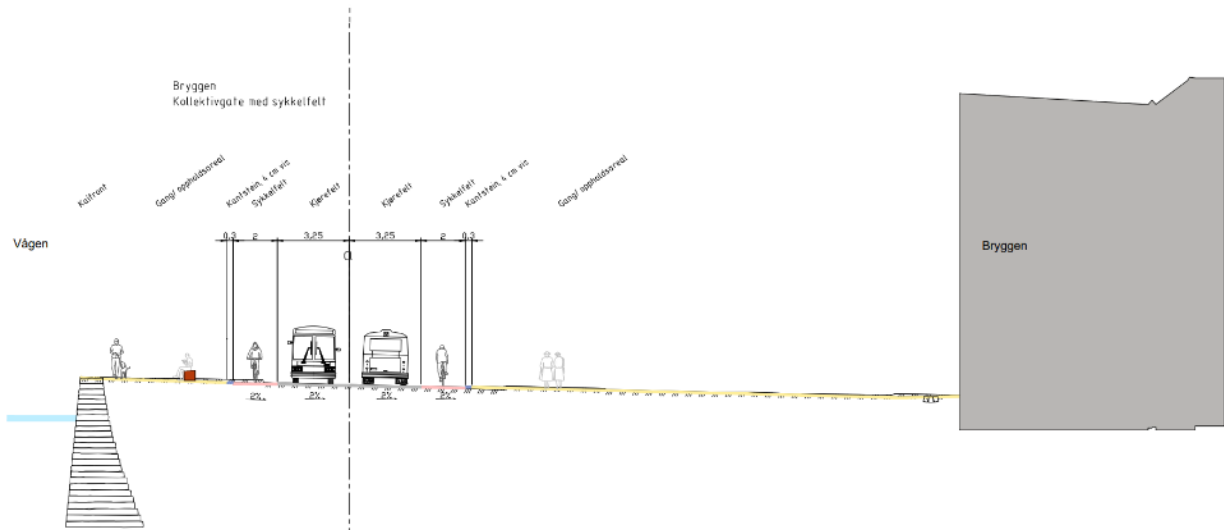


Figure 4-12: Typical cross-section along Bryggen.



Figure 4-13: Illustration made of planned solution.

The establishment of a public transport corridor with bidirectional cycle lanes along Bryggen (see Figure 4-12, Figure 4-13) will increase the available public space between the traffic area and the Bryggen buildings, while slightly reducing the space between the traffic area and the quay edge. Existing bus bays

and taxi lay-bys, including shelters, will be removed, resulting in a more continuous and coherent street profile along Bryggen. This is assessed as a positive impact compared to the reference situation.

Traffic volumes along Bryggen and at Finnegården will be substantially reduced compared to the current situation and less than the reference situation. The most significant reduction relates to private vehicle traffic. While the relative share of heavy traffic may increase, the absolute volume will be significantly lower than today and is estimated to be approximately half.

To reduce the barrier effect along Bryggen, several adjustments to the public transport corridor and bidirectional cycle lanes have been introduced during the planning process. Derogations have been sought for the omission of traffic islands (required due to crossing distances). Further, a deviation from standard kerb heights has been proposed, with kerb heights of 4–6 cm from Bryggesporden to Dreggsallmenningen, and 4 cm along the section in front of Bryggen. This represents an improvement compared to the reference situation but remains higher than the 2 cm guideline set out in “*Forslag til byromsutforming for Bryggen og Torget*”, which has informed the planning process. At Torget, kerb heights vary between 0 and 18 cm.

Impact: **Somewhat degraded**

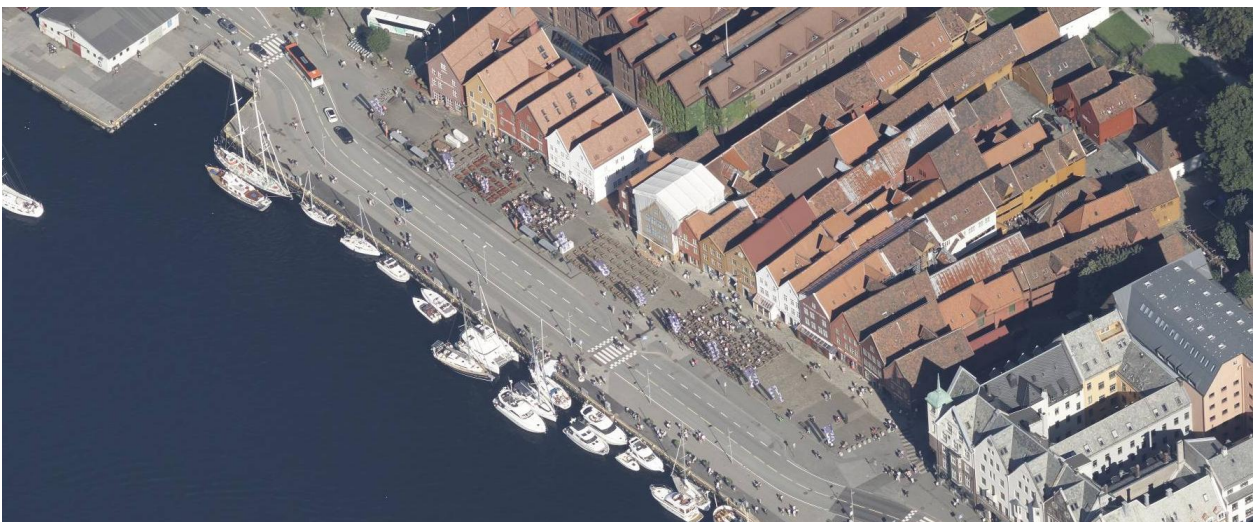


Figure 4-14. The current situation at Bryggen. Source: 1881.no.

Impact assessment

Functional impact

- ✓ A somewhat larger public gathering space is created in front of Bryggen.
- ✓ The measure introduces a functional barrier, reinforcing the perception of a traffic-dominated space along Torget and Bryggen. The impact is caused by the introduction of the bidirectional cycle lanes. Kerb heights somewhat lowers the effect.
- ✓ Visitors and pedestrians will be required to cross multiple lanes with different traffic modes at Bryggen and Finnegården.
- ✓ Reduced space between the traffic area and the quay edge (reduced by approximately 1 metre).
- ✓ The traffic corridor is shifted closer to Finnegården, resulting in reduced public space for visitors and pedestrians in front of the Hanseatic Museum.

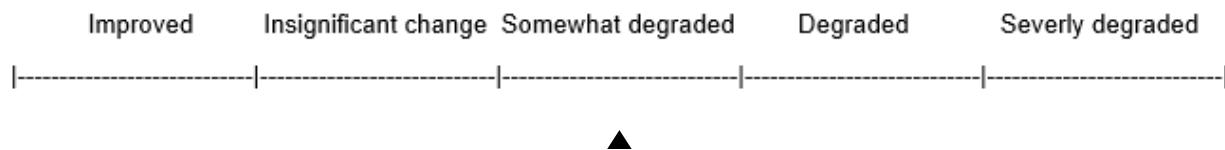
Visual impact

- ✓ The transformation of the quay area in front of Bryggen will result in a coherent and unified surface treatment.

Structural impact

- ✓ Kerb heights will be lower than in the current situation, but still higher than recommended in "Forslag til byromsutforming for Bryggen og Torget".
- Excavation to a depth of approximately 0.5–1.0 metres will be required to upgrade the road structure and establish cycle lanes. This does not result in direct conflict with archaeological deposits.

The impact is primarily related to the functional barrier effects, which are detrimental to the perception and coherence of the cultural environment as a whole. The overall impact is assessed as **"somewhat degraded."**



Value	Supporting attribute	Impact	Degree of consequence
Historic townscape and historic trading port	Historic harbour district (tangible)	"Somewhat degraded"	Medium negative consequence (2-)

Tabell 4-5 Basis for impact assessment.

Category	Improved	Insignificant	Somewhat degraded	Degraded	Severely degraded
Direct conflict		x			
Proximity effects			x		
Visual effects		x	x		
Design		x	x		
Further use of the cultural environment			x		

4.1.4 Supporting attribute – Archaeological deposits (outside of World Heritage property)

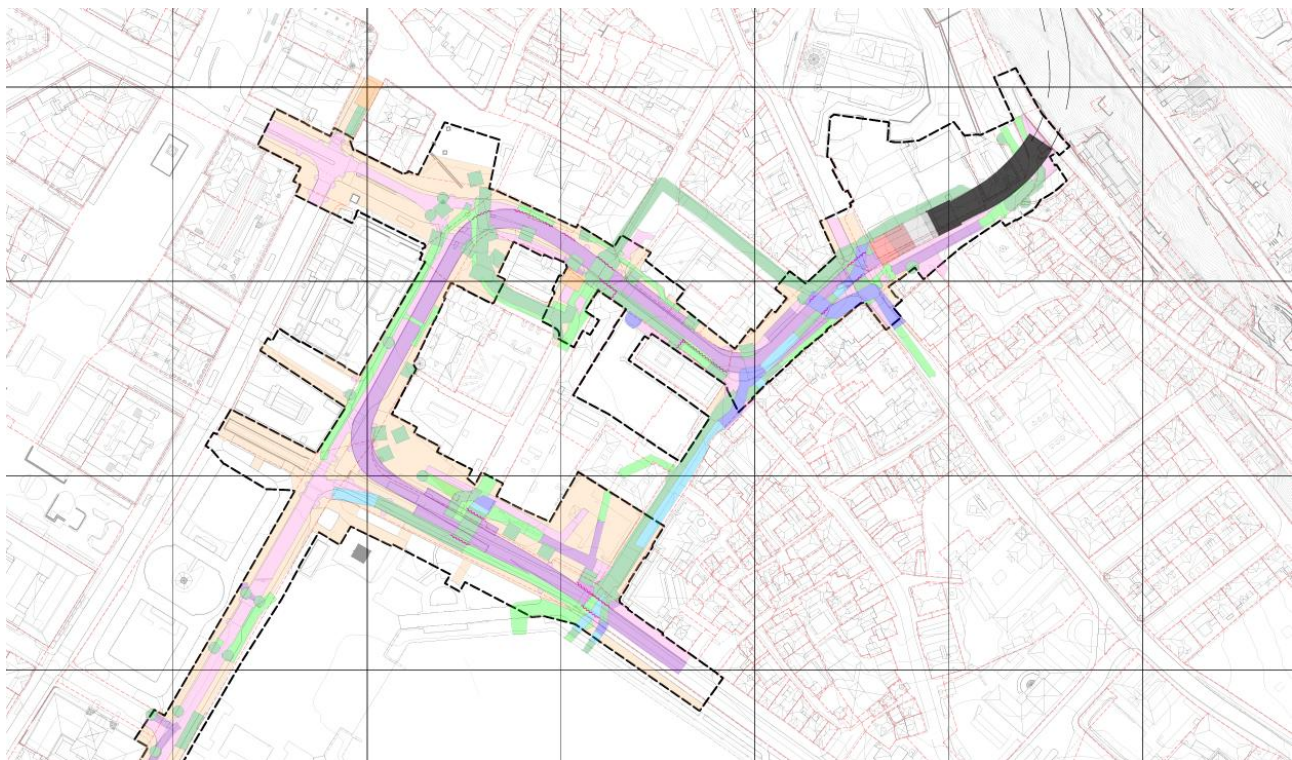
The archaeological deposits outside of the World Heritage property function as a sustaining value and give the deposits within a greater context. The medieval archaeological deposits called Middelalderbyen Bergen (id 89049) is characterized as a sustaining value in the Bryggen management plan [14].

Value level	Value	Supporting Attribute	Assessed objects and elements
OUV	Historic townscape and historic trading port	Archaeological deposits (tangible)	Middelalderbyen Bergen (id 89049) outside of the World Heritage property

The objects listed above may be affected by:

- Light rail alignment, VA systems and associated infrastructure
- Traffic corridor, water and wastewater infrastructure (VA) and associated infrastructure between Torget and Skuteviken
- Hydrogeological changes
- Changes in traffic

Certain streets have been excluded from the assessment due to their low potential for archaeological deposits dating to the pre-reformation period. The excavation plan forming the basis for the assessments is presented below:



Gravedybde

0 - 0,5 m	2,5 - 3,0 m	5,0 - 5,5 m
0,5 - 1,0 m	3,0 - 3,5 m	5,5 - 6,0 m
1,0 - 1,5 m	3,5 - 4,0 m	6,0 - 21 m
1,5 - 2,0 m	4,0 - 4,5 m	
2,0 - 2,5 m	4,5 - 5,0 m	Grøfteavstivning, permanent

Figure 4-15. Excavation plan.



Figure 4-16. Excavation plan, exit from underground stop at Sverresborg. Explanation above.

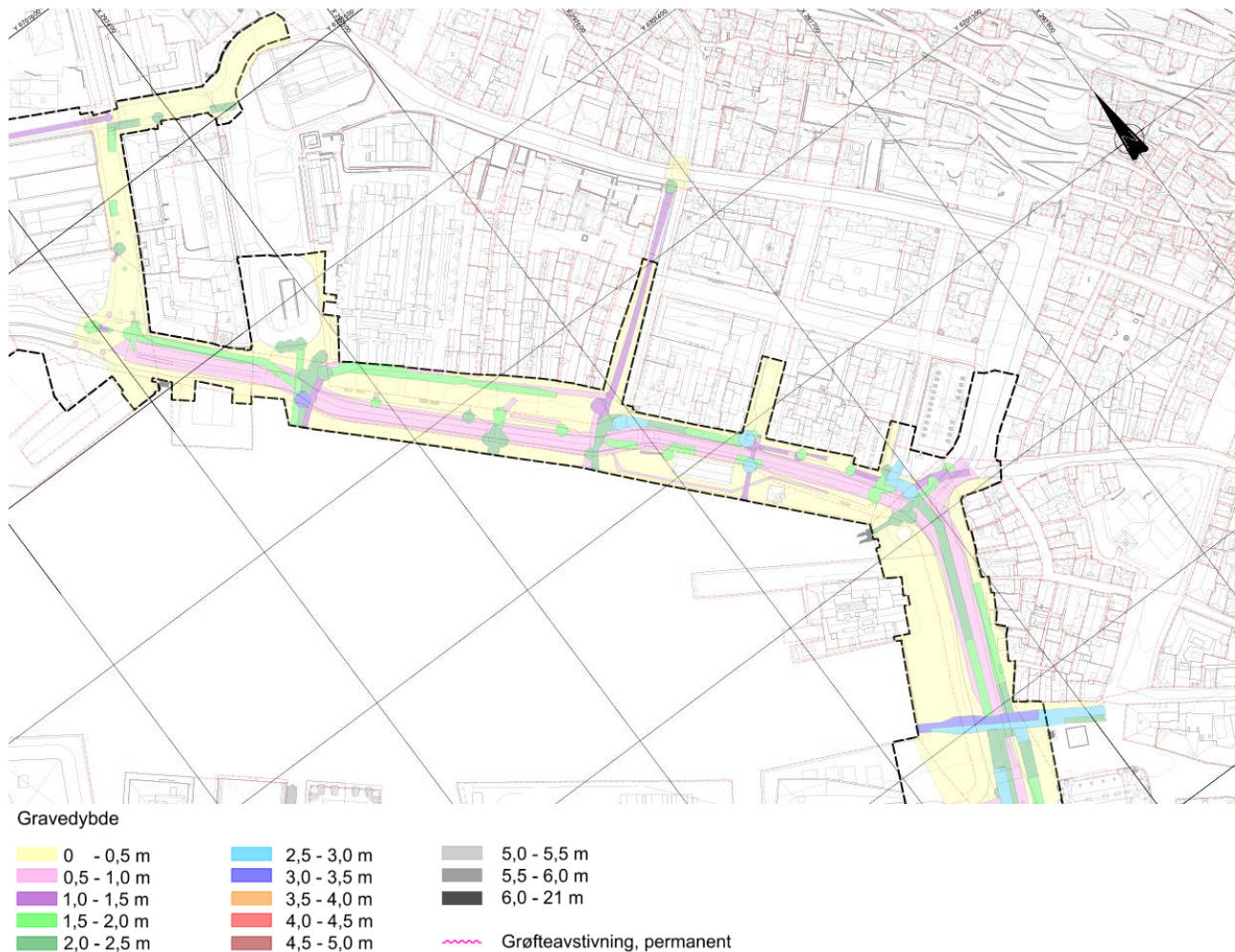


Figure 4-17: Excavation plan.

Light rail alignment, VA-systems and associated infrastructure

Throughout the city centre, a light rail alignment will be established, along with various water and wastewater (VA) and associated infrastructure measures. Upgrading this infrastructure is a positive measure according to the management plan. This is linked to changing current VA infrastructure and not necessarily establishing new VA trenches. Although it is determined to be positive for the World Heritage property in itself, the underground work can have an impact on the archaeological deposits. Excavation plans have been prepared (see figure 4-15, figure 4-16, figure 4-17) illustrating the anticipated excavation depths within the central area.

In parts of Småstrandgaten, Allehelgens gate, and Kong Oscars gate, conflicts with pre-Reformation archaeological deposits are expected. The presence of archaeological layers in Heggebakken, particularly in the vicinity of the identified masonry structure, remains uncertain; however, their occurrence cannot be ruled out.

In streets such as Kaigaten, Christies gate, and Småstrandgaten, extensive excavation works have previously been carried out, and a low level of conflict is therefore anticipated, despite these areas being located within the boundary of the protected medieval town area.

Nevertheless, the proposed measures are expected to result in conflicts with protected medieval urban deposits in certain streets, due to the establishment of the light rail and the relocation of water and wastewater systems and other infrastructure.

Impact: **Degraded**

Traffic corridor, VA-systems and associated infrastructure between Torget and Skuteviken

The establishment of a public transport corridor with bidirectional cycle lanes entails only limited excavation, typically to depths of 0.5–1.0 metres. On this basis, excavation works associated with the cycle infrastructure are not considered to result in impacts on pre-Reformation archaeological deposits.

However, water and wastewater (VA) measures and the relocation of infrastructure will, in certain locations, require deeper excavation within the protected medieval town area, which may result in conflicts with pre-Reformation archaeological deposits within the medieval city of Bergen.

Along Torget, Vetrldsallmenningen, and further north towards Bryggen, a number of excavation works will be undertaken as part of the water and wastewater measures. In Vetrldsallmenningen, extensive excavation will be required, with depths of up to 3 metres immediately south of Finnegården. Along Bryggen, excavation depths of up to 1 metre will be required due to private service connections, while at the northern end of Bryggen, west of the SAS Hotel, excavation depths of up to 2 metres will be necessary. From Nikolaikirkeallmenningen and Dreggsallmenningen, stormwater pipelines will be established towards Vågen, requiring excavation of up to 2.5 metres. A similar installation will be established approximately in the middle of Bryggen, at some distance from the buildings, with comparable excavation depths. Outside the corner of Bryggen 15, localised excavation of up to 3 metres will be required.

During the construction phase, it will be essential to implement mitigation measures, including excavation in wet trenches, the use of prefabricated structures, and the placement of low-permeability materials around infrastructure. A monitoring and management plan for groundwater levels and pore pressure must be established prior to, during, and after construction.

Impact: **Degraded**

Hydrogeological changes

Extensive interventions in organic cultural deposits and excavation into bedrock may affect groundwater levels. Changes in groundwater conditions—resulting from the removal of organic layers or from new underground cavities reducing groundwater recharge from the hillside—may in turn affect archaeological deposits over a wider area.

Westwards towards Vågsbunnen, where organic cultural deposits increasingly depend on stable groundwater conditions, hydrogeological modelling indicates potential groundwater drawdown of up to 5 cm in Vågsbunnen and Finnegården. Ground conditions in the Vågsbunnen area are heterogeneous, and there is known susceptibility to settlement.

In Sandbrogaten, valuable archaeological deposits are present, especially in the lower part of the street. In the lower part of Sandbrogaten the groundwater model shows 5 cm groundwater drop, increasing to about 15 cm towards the planned exit from the underground station (Sverresborg). The project design must account for the shallow depth of these deposits and include measures to stabilise groundwater conditions.

The tunnel portal at Heggebakken represents a particular challenge, as the tunnel emerges below the groundwater level. Archaeological deposits are possibly located in close proximity, and a waterproof construction will therefore be required. As a consequence, infiltration wells must be temporarily established in the area to maintain groundwater levels in Heggebakken and Sjøgaten.

Impact: **Degraded**

Changes in traffic

The City Centre Traffic Plan (Trafikkplan sentrum) will result in a substantial reduction in overall traffic volumes. The introduction of the light rail in a tunnel may further reduce traffic levels.

Given the magnitude of this reduction, it is considered positively that the pressure on archaeological deposits will ease to a slight degree.

Impact: **Positive**

Impact assessment

Functional impact

- Not relevant

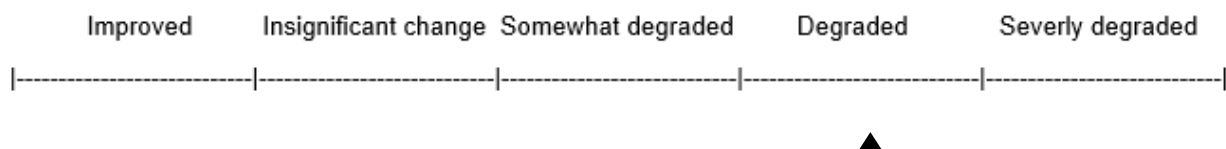
Visual impact

- Not relevant.

Structural impact

- ✓ The measure will have direct impacts on medieval archaeological deposits within the protected cultural heritage site "Middelalderbyen Bergen".
- ✓ There is a risk that the measure may affect groundwater conditions over a wider area.
- ✓ Reduced traffic levels will lessen the pressure exerted by current traffic on archaeological deposits.
- ✓ Upgrading VA infrastructure can be positive for the World Heritage property as a whole.

Due to the proposed interventions, several conflicts with pre-Reformation archaeological deposits have been identified, as outlined above. As a result, parts of the medieval city of Bergen will be lost due to direct physical impacts. There is also a potential for groundwater drawdown, which may affect preservation conditions. The overall impact is assessed as **"degraded."** The impact assessed is mainly connected to the uncertainty regarding reduced groundwater levels.



Value	Supporting attribute	Impact	Degree of consequence
Historic townscape and historic trading port	Archaeological deposits (tangible)	"Degraded"	Large negative consequence (3-)

Tabell 4-6 Basis for impact assessment.

Category	Improved	Insignificant	Somewhat degraded	Degraded	Severely degraded
Direct conflict				x	
Proximity effects			x		
Visual effects		x			
Design		x			

Further use of the cultural environment				x	
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4.1.5 Attribute – The old wharf and 62 buildings of former township (tangible)

In today's city centre 62 buildings remain of this former townscape. The remaining buildings contain sufficient elements to demonstrate how this colony of bachelor German merchants lived and worked and further illustrates the use of space in the district. The urban elements are mainly buildings with two- to three stories separated by narrow passages towards the gardens in the back and quay in the front [18].

Value level	Value	Attribute	Assessed objects and elements
OUV	Contemporary urban cityscape	The old wharf and 62 buildings of former township (tangible)	Old wharf consisting of 62 buildings remain of this former townscape

The objects listed above may be affected by:

- Traffic changes
- Changes in use and functions
- Public transport corridor and bidirectional cycle lanes along Bryggen
- Upgrading of public spaces
- Lighting arrangement

Traffic changes

Changes in traffic are primarily related to a reduction in overall traffic volumes and, to a lesser extent, to changes in traffic patterns. In the current situation, the traffic corridor along Bryggen and Finnegården has an AADT of approximately 10,700 vehicles, with a heavy vehicle share of 17%, while Øvregaten has an AADT of approximately 3,000 vehicles, with a heavy vehicle share of 7%.

In the reference situation indicates a substantial reduction in traffic volumes in the city centre, including along Bryggen and in Øvregaten. Traffic modelling shows that the City Centre Traffic Plan, even without the light rail development, will result in a significant reduction in traffic through the city centre. The proposed plan nevertheless provides a further improvement, particularly along Bryggen, while a slight increase in traffic is expected in Øvregaten with the light rail in a tunnel. This difference is considered negligible for Øvregaten.

For existing buildings, the substantial reduction in traffic loads will result in decreased impacts from noise, road dust, and vibrations. The overall change in traffic is therefore assessed as a minor positive effect, although this effect is primarily attributable to the City Centre Traffic Plan rather than the light rail/cycle project itself.

Impact: **Slightly positive**

Changes in use and functions

The Bryggen Foundation (Stiftelsen Bryggen), a major property owner at Bryggen, has prepared a functional analysis [29] documenting current use of forecourt and outdoor areas, the functions in operation, and the needs arising from them. The functional analysis was presented during a stakeholder consultation meeting. The report shows that conflicts and challenges primarily occur where multiple functions are required to operate simultaneously (see figure 4-18).

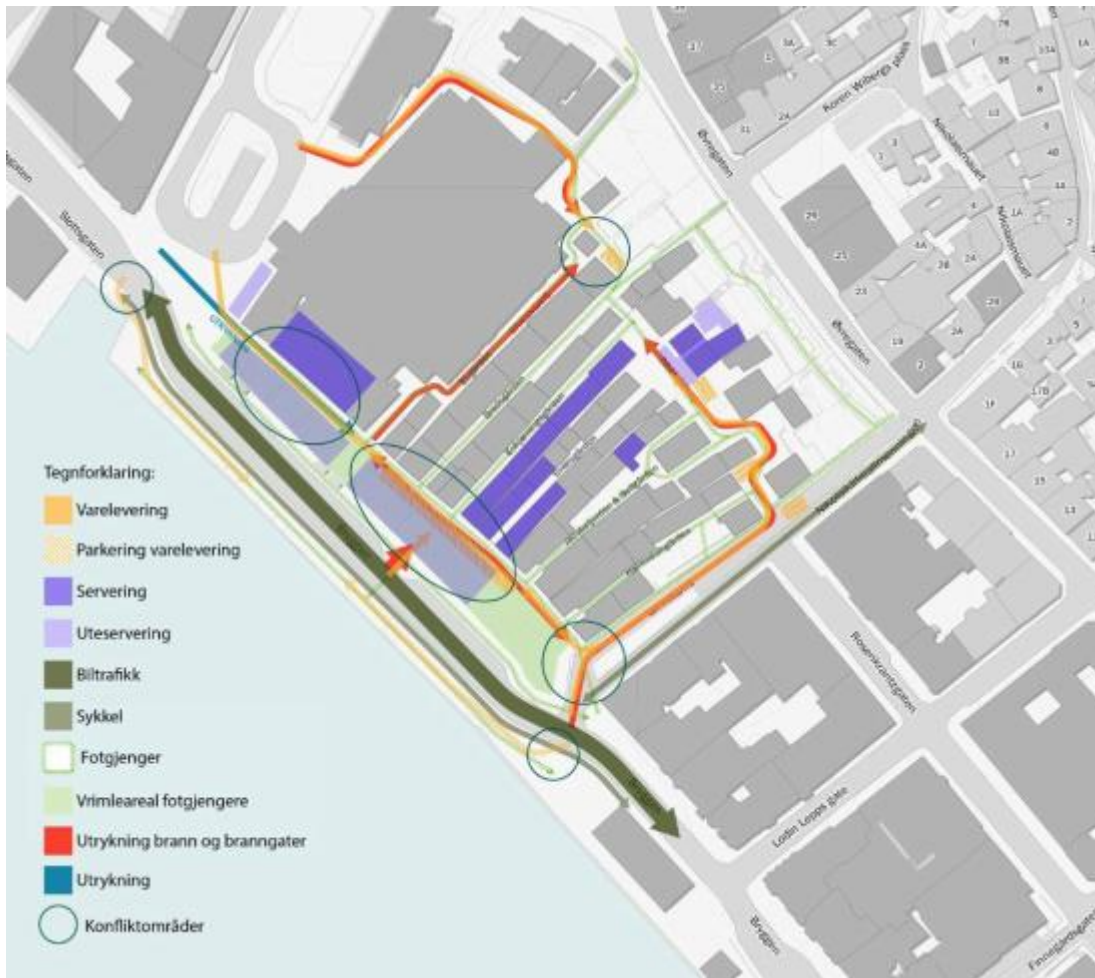


Figure 4-18: Map summarising key conflict points, including fire safety, goods delivery, outdoor serving, and other uses. Source: Stiftelsen Bryggen.

As in the current situation, goods delivery is planned within areas which is also used by pedestrians/visitors and for outdoor service during the summer season. Similar to today's situation, the provision of outdoor service will continue to conflict with pedestrian flows and guided groups under the proposed scenario.



Figure 4-19: Traffic circulation and goods deliveries at Kjøremønster og varelevering Bryggen.

Existing bus and taxi lay-bys, as well as current bus stops with shelter, will be removed and relocated further northwest, away from Bryggen. These measures may contribute to a limited redistribution of visitors, which is assessed as a minor positive effect. However, they are not expected to substantially change visitor flows to the World Heritage property, particularly during peak season.

Based on the available knowledge, the plan largely maintains current functions and associated challenges and does not provide clear solutions to these issues.

The exit to Sandbrogaten from the underground station will improve access to the Fortress area, Mariakirken, and Øvre regat. It may also contribute to some redistribution of visitors compared to the current situation. However, this effect is difficult to quantify and is not expected to result in a significant redistribution of visitors, nor to substantially reduce visitor pressure or wear caused by tourism.

The measure is not expected to significantly affect the overall conditions for interpretation and visitor experience in the area (see figure 4-20), but it will reduce the available space in front of the Hanseatic Museum, which is an important area for visitor experience. This is considered to be a negative effect of the plan and is decisive for the impact assessment connected to use and functions. Increased bus traffic in the vicinity of Mariakirken is considered negative for visitor routing and may create challenging conditions for guided groups in an area with limited space.

Impact: **Somewhat degraded**



Figure 4-20: Heritage interpretation routes at Bryggen and Finnegården. Source: Bymiljøetaten. Dark yellow line: Mediation line, dark yellow circle: mediation stop sites, purple circle: Hanseatic Museum hotspots, green circle: other mediation stakeholders.

Public transport corridor and bidirectional cycle lanes along Bryggen

The establishment bidirectional cycle lanes will introduce a new element and may affect the perception of the Bryggen buildings and their relationship with Vågen. The measure will reduce the available space for visitors along the outer edge of Bryggen facing Vågen, while providing a corresponding increase in space on the inner side for pedestrians and visitors.

The removal of bus shelters at Bryggen will reduce the ability to set down large groups of tourists directly at Bryggen, which is assessed as positive for the visitor experience. This may contribute to a wider spatial distribution of visitors and reduce pressure within the World Heritage property itself.

Upon completion, Bryggen and its southern section will largely be free of general traffic, limited to buses, cycles, and some goods delivery.

Impact: **Slightly positive**

Upgrading of public spaces

In connection with the planning of the now approved daylight-option over Bryggen, a concept was developed for the design of interpretative elements embedded in the pavement, together with a binding illustrative plan for a comprehensive upgrade of the public realm. This work has guided the planning process, and the detailed zoning plan for the main cycle route Torget–Skuteviken carries forward these principles.

In the cycle plan, kerb heights of 4 cm are introduced along Bryggen between the cycle lanes and sidewalks. The interpretative elements incorporated into the surface design are structured around three key themes:

- the historic quay line in front of Bryggen and the Hanseatic Museum
- the property boundaries in front of Bryggen
- the historic working zone along the waterfront

The public squares (allmenninger) are designed to emphasise the relationship to Vågen, with different surface treatments adapted to and highlighting the cultural heritage context. A comprehensive upgrade of the paving, incorporating clear interpretative elements, would represent an improvement compared to the current and reference situation, which has developed incrementally over time and appears somewhat fragmented, despite certain visible elements (see figure 4-21, figure 4-22).

Impact: **Positive**

If a comprehensive upgrade of the public space is not realised alongside the proposed measure, this may, depending on the detailed design and delivery of the works, result in additional barrier effects. Consequently, many of the anticipated benefits of the proposed development may be diminished or lost.



Figure 4-21: Illustration of upgraded public space on Bryggen.

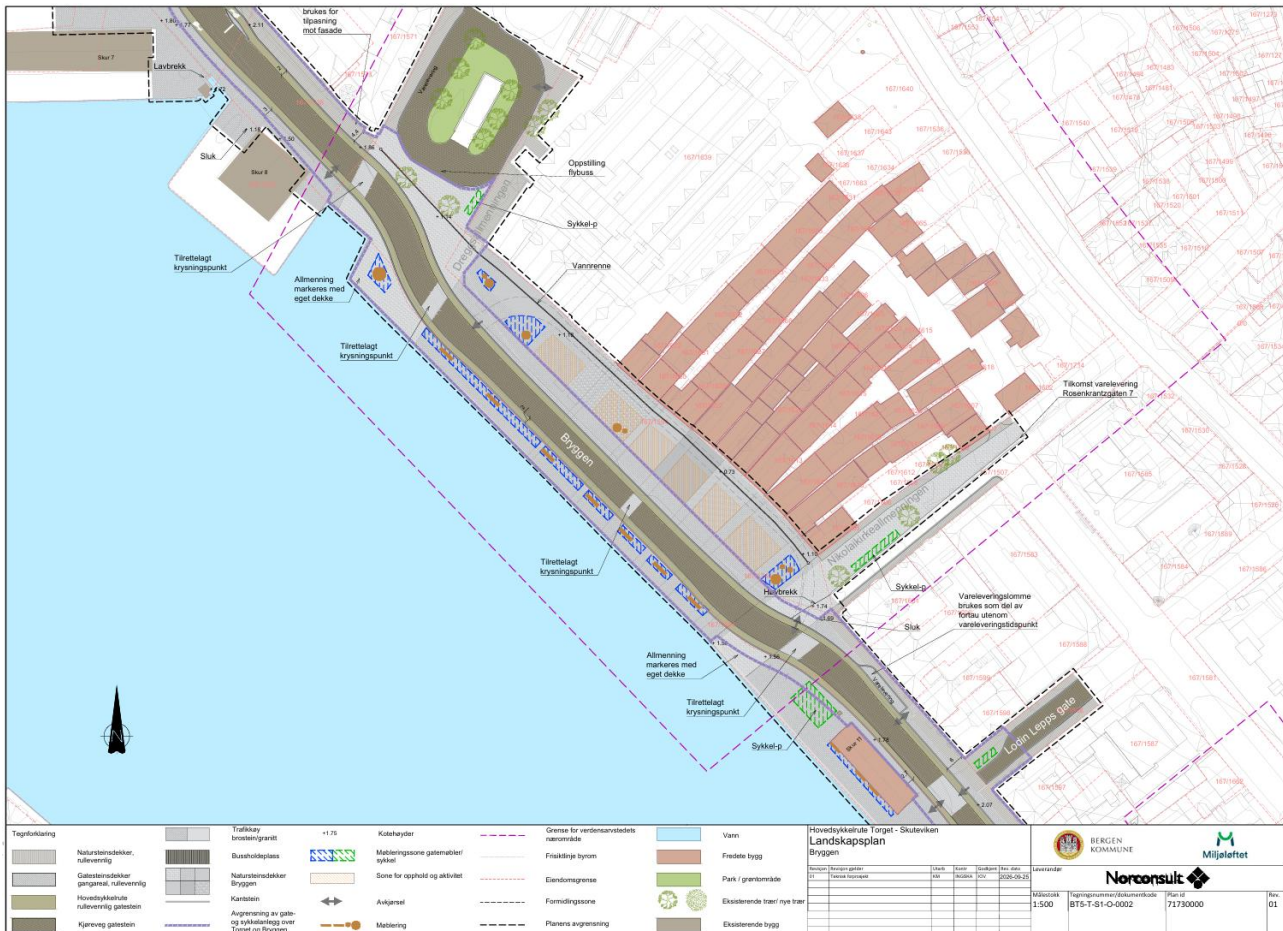


Figure 4-22. Landscape Plan for Bryggen – Main Cycle Route Torget–Skuteviken. The lighting columns described in the text below will be added to the illustration in autumn 2026.

Lighting arrangement

The legally binding illustrative plan also includes a lighting concept, with the placement of lighting masts corresponding to the solution presented in “*Forslag til byromsutforming for Bryggen og Torget (2022)*”. The masts are positioned on the outer side of the cycle lanes towards the quay front, with a spacing of approximately 27 metres between each mast (see figure 4-23). By providing the Hanseatic Museum with façade lighting consistent with that of the main part of the World Heritage property, the proposed lighting concept contributes to a stronger visual coherence of the site as a whole and enhances the overall experiential value of the World Heritage property.

Impact: **Positive**

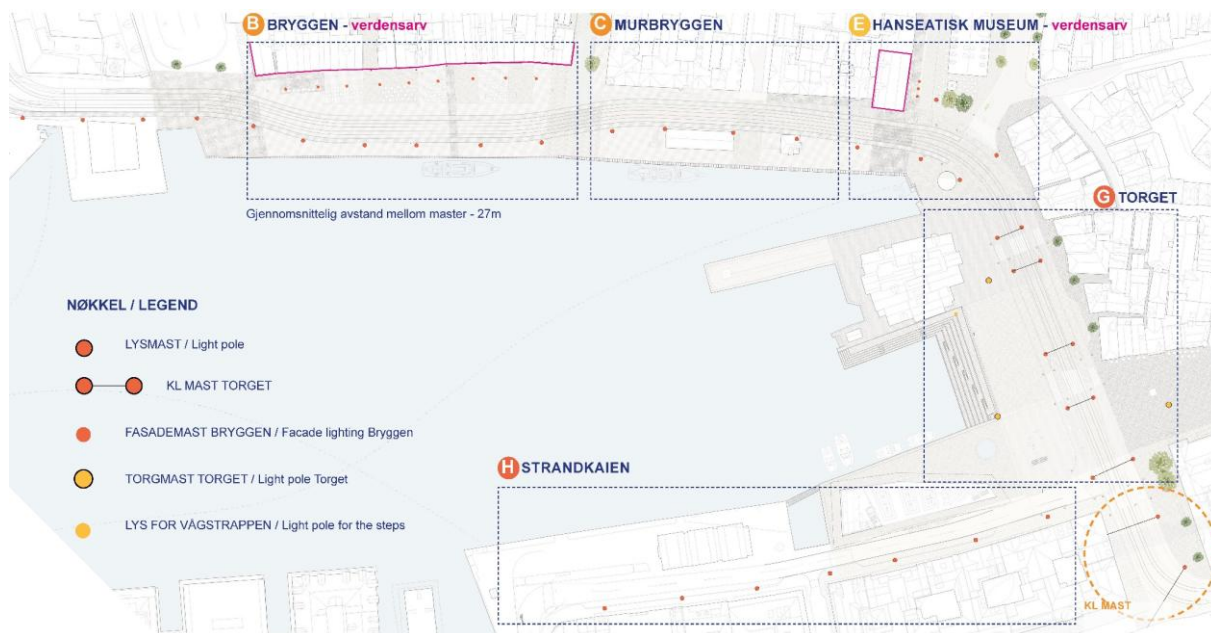


Figure 4-23: Lighting Concept Plan (illustration by the “Mot Vågen” project group). Please note that the illustration depicts the light rail route; however, the lighting design is identical.

Impact assessment

Functional impact

- ✓ Removal of bus shelters along Bryggen
- ✓ Removal of bus and taxi lay-bys along Bryggen
- ✓ Kerb heights are reduced compared to the reference situation.
- ✓ Reduced public space (crowding area) in front of Finnegården.
- ✓ No measures are proposed that resolve current functional conflicts.
- ✓ Existing functions are largely maintained.
- An insignificant reduction in private car and bus traffic along Bryggen and Finnegården compared to the reference situation. The majority of this reduction is attributable to the City Centre Traffic Plan rather than the light rail project itself.
- Increased bus traffic in the vicinity of Mariakirken is insignificant compared to the reference situation.

Visual impact

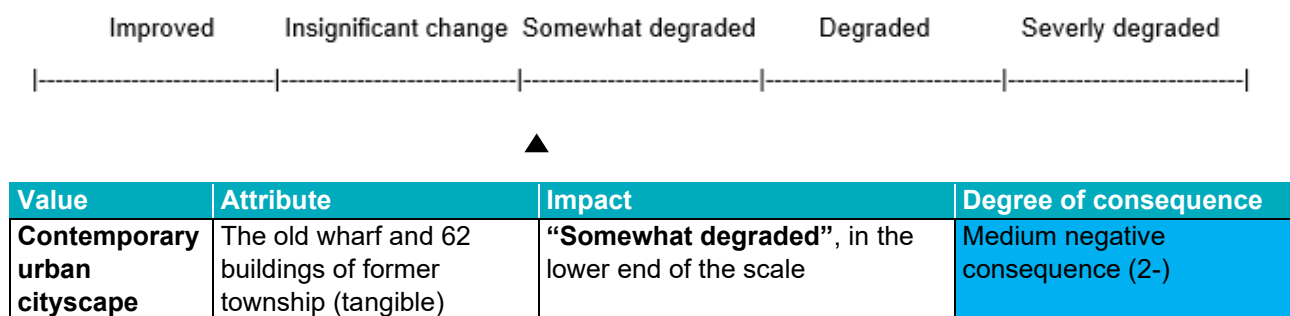
- ✓ Kerb heights contribute to a less pronounced traffic structure within the streetscape.
- ✓ The existing lighting concept is retained.
- ✓ The new binding illustrative plan largely continues the principles of the currently approved zoning plan.
- ✓ The transformation of the quay area in front of Bryggen will result in a coherent and unified surface treatment.

Structural impact

- ✓ Construction works in front of Bryggen and Finnegården will result in temporary impacts (construction phase)
- ✓ The proposed measures do little to address challenges related to high visitor numbers and associated wear and tear.

The most significant change compared to the current situation is the reduction in traffic volumes. This is primarily attributable to the City Centre Traffic Plan that is included in the reference situation; however, the proposed measures further reduce traffic, particularly along Bryggen, which is assessed as a positive effect. At Finnegården, the establishment of a public transport corridor with bidirectional cycle lanes will reduce available public space, which is assessed as a negative effect. The plan does not address existing challenges related to visitor pressure and functional conflicts and largely maintains the current situation.

A comprehensive upgrade of the public realm is proposed and would represent a positive improvement. The relocation of bus shelters further north and the slight shift of the traffic corridor towards Vågen are also considered positive measures. The traffic area is moved closer to Finnegården and the effect represents a slight deterioration compared to the reference situation. The impact is therefore assessed as **“somewhat degraded”**, at the lower end of the scale.



Tabell 4-7: Basis for impact assessment.

Category	Improved	Insignificant	Somewhat degraded	Degraded	Severely degraded
Direct conflict		x			
Proximity effects			x		
Visual effects		x			
Design			x		
Further use of the cultural environment		x			

4.1.6 Supporting attribute – Historic wooden city (tangible) – Impact assessment

Outside of the World Heritage property and the closest proximity there are areas and buildings that work as a sustaining value to the Bryggen World Heritage property. The wooden city to the north and northeast is acting like a frame around the historic city Centre.

Value level	Value	Supporting Attribute	Assessed objects and elements
OUV	Contemporary urban cityscape	Historic Wooden city (tangible)	Wooden dwellings beyond Bryggen and in the medieval city centre (outside of property)
			Sandviken area (outside of property)
			Sandviksbodene (id 91811, outside of property)
			Heggebakken

The objects listed above may be affected by:

- Light rail alignment
- Tunnel portal
- Traffic changes

Light rail alignment

Three buildings belonging to Rosegrenden in Sandviken are in conflict with the proposed rail and traffic corridor and will need to be removed. Rosegrenden forms part of the historic “grender” of Sandviken, comprising early urban small-scale housing from the 18th and 19th centuries. Plot layouts were historically governed by the landowners of Sandviken, with the objective of minimising encroachment on agricultural land. As a result, the built fabric is dense and compact.

Rather than demolishing the buildings, the proposal is to relocate them within Rosegrenden without dismantling them (see figure 4-25). The detailed zoning plan allocates space for the new location of the three houses. The proposed relocation has been designed regarding the surrounding topography and existing building structure, and the relocation will be carried out during the construction phase.

The conflict is assessed as having a negative impact on the attribute *Historic wooden city*. However, the fact that the buildings are retained and relocated within the same neighbourhood is expected to partially mitigate this impact.



Figure 4-24: Oblique aerial photograph showing the buildings that must be demolished (red crosses) as a result of the proposed development. The plan proposal allows for the buildings to be relocated within the hamlet.



Figure 4-25: Proposed relocation of buildings within "Rosegrenden".



Figure 4-26. The current situation in i Sandviken (shown here at Sandvikstorget). Source: 1881.no.

Along Sandvikstorget, a light rail alignment and stop will be established, while also accommodating flood pathways and ensuring the safeguarding of listed buildings. The entire Sandvikstorget area is proposed as a “shared space”, characterised by low kerb heights and a continuous surface in stone paving, with natural stone walls adapted to the historical context.

The design takes into account the historical development of the area, including how the cultural heritage buildings frame the present square, which was reclaimed in the mid-20th century beyond the quay structure of Bagerfjæren dating from the 1880s.

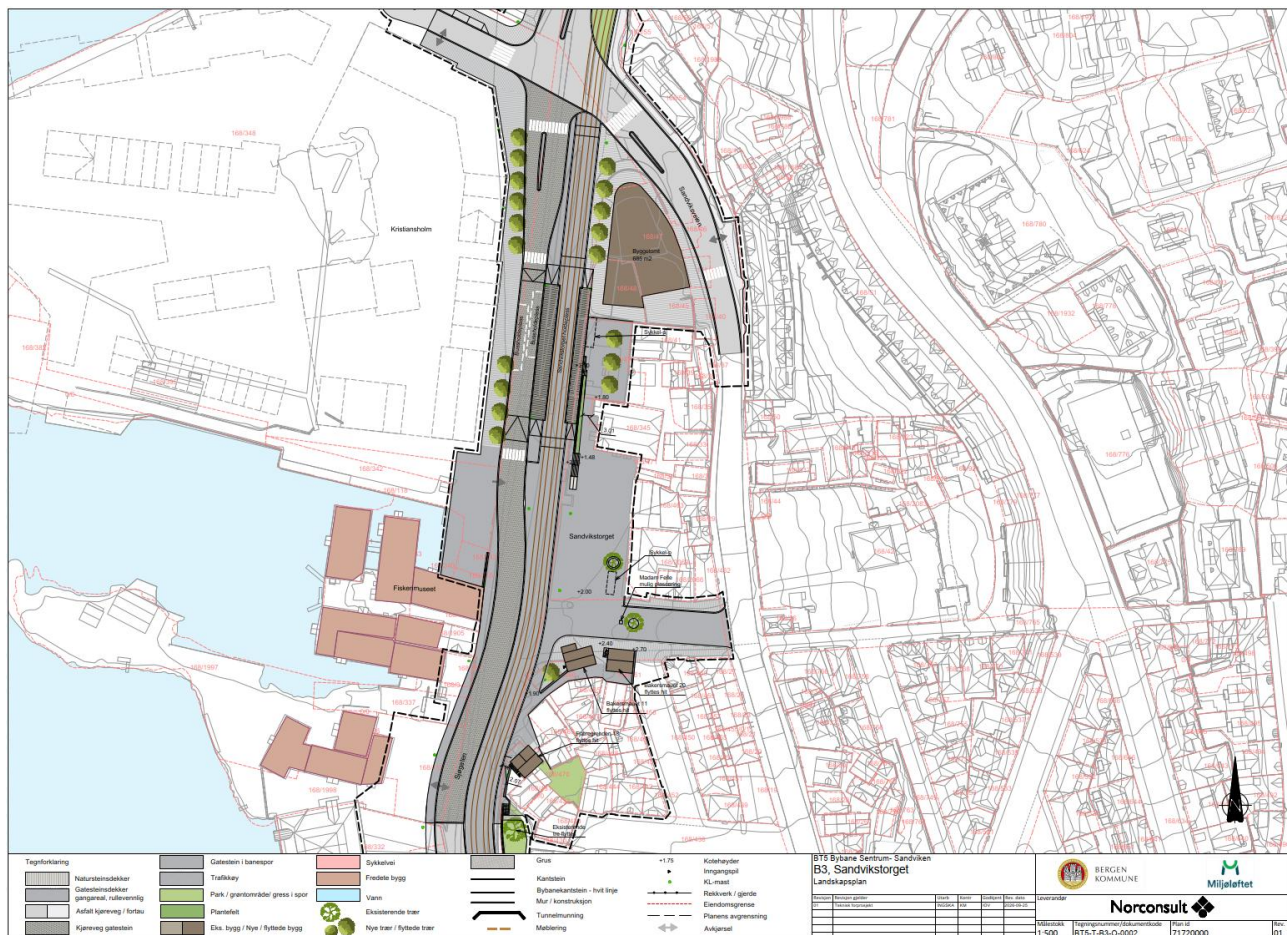


Figure 4-27. BT5-T-B3-O-0002 Landscape design plan Sandvikstorget.

The light rail stop will be located at the northern end of Sandvikstorget. A bus stop is planned in parallel with the light rail stop. The stop area does not encroach upon Sandviksboder 12–24, where the area protection designation imposes strict requirements related to the cultural environment, and avoids conflict with the visual and spatial axis extending from Sandvikstorget towards the sea.

In combination with the planned transformation of the Neumann site (where the former building mass has already been demolished), as part of the Kristianholm plan, the stop area is expected to contribute to a positive enhancement of the area. It will strengthen accessibility and improve the experiential value of the cultural environment in Sandviken compared to the reference situation.

This measure is not expected to affect the harbour area in Sandviken as a supporting value of the World Heritage property.

Impact: **Degraded**

Tunnel portal

The proposed measure is primarily planned along existing road and traffic corridors or in close proximity to these. The proposed measure is primarily planned along existing road and traffic corridors or in close proximity to these. The measure will require the excavation of a substantial construction pit in an area characterised by historic wooden buildings. In this context, Heggebakken 1 and the Barneasylet (Children's Asylum) are of particular importance. Heggebakken 1 is located at the edge of the 1702 fire zone and may represent a rare example of a wooden building with origins or retained elements predating 1700 in this area.

The building has high value as part of a historically evolved wooden urban environment. Barneasylet also holds cultural heritage value and may be loosely associated with Hanseatic activity.

The proposed measure is primarily planned along existing road and traffic corridors or in close proximity to these. The measure will require the excavation of a substantial construction pit in an area characterised by historic wooden buildings. In this context, Heggebakken 1 and the Barneasylet (Children's Asylum) are of particular importance. Heggebakken 1 is located at the edge of the 1702 fire zone and may represent a rare example of a wooden building with origins or retained elements predating 1700 in this area. The building has high value as part of a historically evolved wooden urban environment.

Heggebakken is clearly identified as a defined street structure in historical cartographic material dating back to the 18th century. In 1492, the bishop granted the Hanseatic merchants a plot in Skivebakken near Heggebakken and the present-day Asylplassen, where ceremonial events such as parrot shooting were held.

The tunnel portal at Heggebakken will be highly visible and will introduce an element that contrasts strongly with the surrounding historical environment and built fabric. The portal is expected to adversely affect the experience of both the Barneasylet and the associated Asylplassen, as well as the immediate surroundings of Heggebakken 1 (see figure 4-28).

Impact: **Degraded**



Figure 4-28: Extract from the model showing the proposed situation at Heggebakken 1 and Asylplassen. The Barneasylet is the yellow building to the right of the tunnelportal, while Heggebakken 1 is the building located to the right of the portal area.

Traffic changes

In Øvregaten and Nye Sandviksveien, a substantial reduction in traffic volumes is expected. Traffic modelling indicates a significant decrease in Øvregaten with the light rail in a tunnel. A similar reduction is expected in Nye Sandviksveien compared to current traffic levels.

However, traffic volumes are also expected to decrease to a similar extent without the light rail, primarily as a result of the City Centre Traffic Plan. The improvement cannot therefore be directly attributed to the light rail or cycle plan. For the historic wooden building environment, the reduction in traffic will nevertheless be positive, resulting in lower noise levels, reduced accumulation of road dust, and decreased vibration impacts, although the latter has not been quantitatively assessed. Compared to the current situation, the future traffic regime is considered less disruptive to the cultural environment.

The introduction of the light rail represents a new element in both the city centre and Sjøgaten. Due to their size and operational frequency, the tram vehicles will inevitably introduce a degree of barrier effect. However, the overall traffic environment will be considerably calmer and generate less noise than the current situation, which is characterised by a higher volume of cars, buses, and heavy vehicles. The system will require the installation of overhead line masts and associated infrastructure, introducing new elements into the streetscape and reinforcing the presence of transport infrastructure in contrast to the surrounding wooden building environment.

Impact: **Slightly positive**

Impact assessment

Functional impact

- ✓ Improved conditions at the listed harbour warehouses nearby Sandvikstorget, including a more coherent surface treatment and a calmer traffic environment.

Visual impact

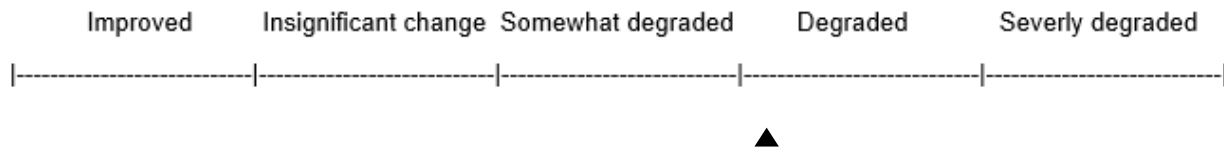
- ✓ The tunnel portal at Heggebakken represents the most significant visual change to the environment.
- ✓ The portal will be highly visible within the historic setting and will weaken the coherence of the historic wooden building environment.
- The light rail is established within the existing traffic corridor through Sandviken and, in the context of significantly reduced traffic volumes, does not introduce additional barrier effects beyond the reference situation for the historic wooden city as a supporting attribute. Impact on the general area in Sandviken must be covered in the general impact assessment.

Structural impact

- ✓ Project adjustments have ensured that Heggebakken 1 does not need to be demolished.
- ✓ The light rail alignment does not affect the listed property Sandviksbodene directly
- ✓ The plans are in direct conflict with three buildings in Rosegrenden, which must be removed due to the selected transport solution and rail geometry. This results in the loss of important heritage elements in the historic parts of Sandviken. Although the plan facilitates relocation it will still alter the characteristics of the environment.

Parts of the cultural environment will be directly affected and require relocation as part of the proposed measures. This will alter internal visual relationships and disrupt established spatial coherence. The design of the intervention contrasts with the surrounding historical context, although it will result in a more coherent surface treatment in the area of the Sandviken warehouses and Heggebakken with Asylplassen.

The measure does not significantly affect the continued use of the cultural environment or public access to it. However, due to the direct conflict with protected wooden buildings, the impact is assessed as “**degraded**”, at the lower end of the scale.



Value	Supporting attribute	Impact	Degree of consequence
Contemporary urban cityscape	Historic Wooden city (tangible)	“Degraded”, in the lower end of the scale	Medium negative consequence (2-)

Tabell 4-8 Basis for impact assessment.

Category	Improved	Insignificant	Somewhat degraded	Degraded	Severely degraded
Direct conflict				x	
Proximity effects				x	
Visual effects			x		
Design				x	
Further use of the cultural environment			x		

4.1.7 Attribute – The objective of conserving Bryggen (intangible) – Impact assessment

Preserving the Bryggen World Heritage site is continuous work and is one of the pillars that supports the OUV. A proposed action can have an impact on how the heritage site is preserved, conserved and managed.

Value level	Value	Supporting Attribute	Assessed objects and elements
OUV	Contemporary urban cityscape	The objective of conserving Bryggen (intangible)	World Heritage property

The objects listed above may be affected by:

- The planned measure

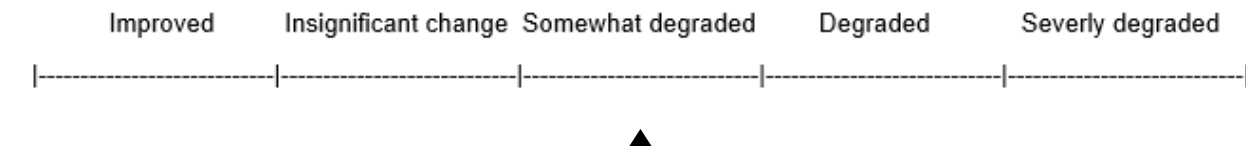
Impact assessment

There are no identified measures that are expected to impact the preservation of the World Heritage property directly. Groundwater modelling indicates that the planned tunnel has the potential to create groundwater drawdown at Bryggen (5-10 cm) and Finnegården (5 cm). The calculations are made with uncertainty which reflects the impact assessment. This can affect the preserving the Bryggen buildings in the future. Finnegården is recently elevated 1 meter and the bulwark foundations are renewed.

Existing environmental monitoring programmes will be continued and are not expected to be adversely affected by the proposed measures. However, it may be necessary to expand the scope of monitoring, which should be clarified in consultation with the relevant cultural heritage authorities.

A comprehensive groundwater model has already been developed and provides a robust basis for assessing potential impacts and evaluating mitigation strategies for different types of interventions.

Overall, the impact is assessed as «**somewhat degraded**».



Value	Attribute	Impact	Degree of consequence
Contemporary urban cityscape	The objective of conserving Bryggen (intangible)	Somewhat degraded	Medium negative consequence (2-)

Tabell 4-9: Basis for impact assessment.

Category	Improved	Insignificant	Somewhat degraded	Degraded	Severely degraded
Direct conflict		x			
Proximity effects			x		
Visual effects		x			
Design		x			
Further use of the cultural environment			x		

Summary of impact and consequence on evaluated attributes

Tabell 4-10: Summary of Value, attribute, impact and consequence.

Value	Attribute	Impact	Consequence
Hanseatic Heritage	Existing buildings (tangible)	Degraded	Large negative consequence (3-)
	Archaeological deposits (tangible)		
Historic townscape and historic trading port	Supporting attribute - Compact medieval urban structures (tangible)	Degraded	Large negative consequence (3-)
	Supporting attribute - Historic harbour district (tangible)	Somewhat degraded	Medium negative consequence (2-)
	Supporting attribute – Archaeological deposits (tangible)	Degraded	Large negative consequence (3-)
Contemporary urban cityscape	The old wharf and 62 buildings of former township (tangible)	Somewhat degraded	Medium negative consequence (2-)
	Supporting attribute – Historic wooden city (tangible)	Degraded	Medium negative consequence (2-)

	The objective of preserving Bryggen (intangible)	Somewhat degraded	Medium negative consequence (2-)
Total impact of proposed action			Large negative consequence

5 Mitigation measures

The impact assessment shall describe the measures planned to avoid, limit, rehabilitate and, if possible, compensate for significant adverse effects on the environment and society both in the construction and operation phase according to § 23 of the Norwegian Regulations relating to impact assessments. In the planning phase, work has been carried out according to the hierarchy of measures, including the preparation of zoning regulations to safeguard and shield the cultural environment from the commercial area.

The Mitigation Hierarchy in M-1941 corresponds with the hierarchy shown in figure 5-1. The difference between the two is the category *Reduce* which is not present in the version presented in M-1941. The category applies to mitigation measures that reduce negative impact, but not to a level where there is negligible impact. In the case of World Heritage, OUV is irreplaceable and cannot be offset. This is therefore not an option and if that is the case the proposed action should be reconsidered or halted.

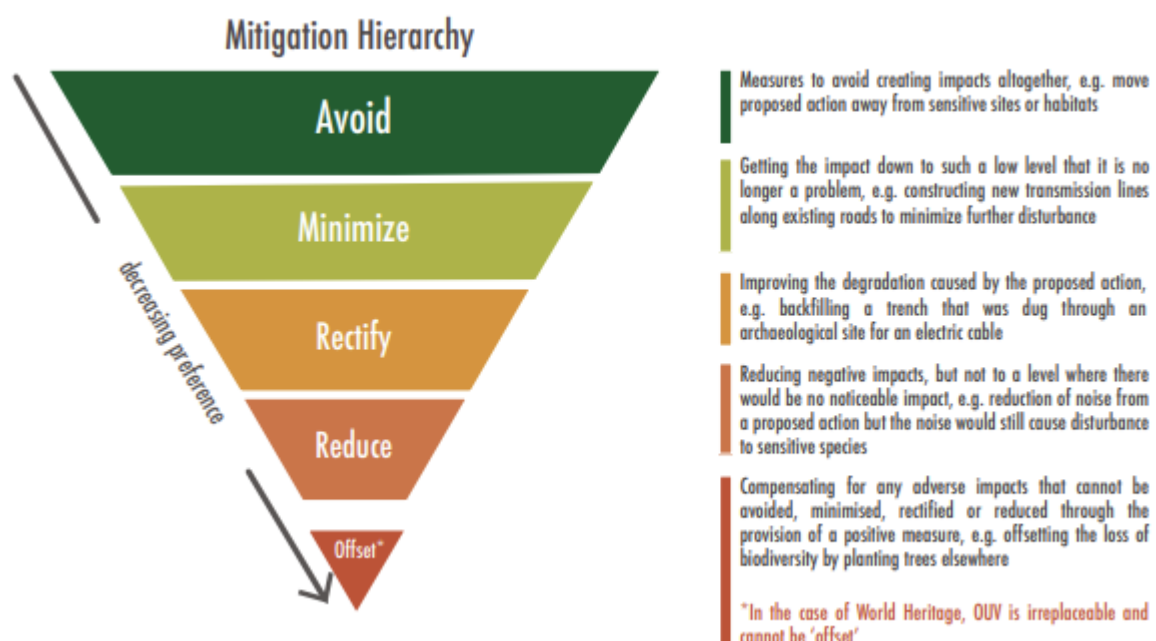


Figure 5-1. The mitigation Hierarchy as shown in UNESCO's guidance and toolkit in a World Heritage context. Source: [2].

5.1 Recommendations

The results of the impact assessment process show negative impact on several attributes and overall, the project has the possibility of affecting OUV. In the following recommendations and measures to mitigate are given. The mitigation measures should be seen as recommendations for the upcoming phase of the project and should be treated as a "living document". The attributes are considered prior to supporting attributes.

Several elements of the proposed measures are inherently difficult to avoid. Conflicts with archaeological deposits are expected, and the tunnel portal at Heggebakken will result in impacts on medieval structures. Given the high cultural heritage value of the area and the applied assessment methodology, it is not at this stage considered feasible to reduce the overall consequence below a **large negative consequence**.

For impacts on existing buildings and archaeological deposits within the World Heritage property, the assessment represents a residual risk evaluation, and there remains uncertainty at the current project stage.

For areas outside the World Heritage property, it is possible to adjust the proposal to improve outcomes for the attributes *Historic Harbour District* and *The Old Wharf and 62 Buildings of Former Township*. These adjustments involve greater adaptation to the cultural environment, ensuring that the project responds more sensitively to the heritage context.

A reduction of the traffic area to a public transport corridor limited to buses, delivery and taxis would significantly reduce the spatial footprint compared to the current proposal. Cyclists could be accommodated within the quay area at Bryggen or the surrounding street network before rejoining dedicated cycling infrastructure at Dreggsallmenningen. Given the high number of visitors throughout much of the year, this would also reduce cycling speeds and possibly spread the cyclist to other areas.

Combined with a comprehensive upgrade of the public realm, such an approach would provide a solution more compatible with the World Heritage property. Under this alternative, impacts on the attribute *Historic Harbour District* would be positive, while several negative effects on *The Old Wharf and 62 Buildings of Former Township* would be substantially reduced.

Recommendations outside of the proposed plan

- A broader strategic plan should be developed to define the role of the World Heritage property within the wider city context and how the city can adapt to it. Current proposals tend to result in multiple mitigation measures rather than fundamentally adapting interventions to the cultural environment.
- The number of tourist buses in the city centre should be reduced, and alternative parking solutions should be established. Along Bryggen, a designated zone allowing only scheduled bus services could be considered.
- There will be a zoning plan to reestablish Katedralskolen (Cathedral School) in the same area. Any new development must be carefully adapted to the existing cultural environment; however, it will introduce new elements and is likely to significantly reduce the historical legibility of the area. The Katedralskolen project is outside of this proposal. A new development may result in increased building heights and a larger overall building volume compared to the reference situation. Given the high level of uncertainty, it is difficult to propose specific mitigation measures at this stage beyond emphasising that any new volumes should be designed to respond as sensitively as possible to the remaining cultural environment.
- Secure that all measures proposed in the cycle plan is realised to secure a unified upgrade of the public spaces.

Attribute - Existing buildings and Archaeological deposits

Due to uncertainty regarding groundwater levels the impact on the attribute is “degraded” which gives a large negative consequence (-3). The impact has the potential of affecting OUV and is an attribute within the borders of the World Heritage property.

Table 5-1: Assessed consequence on attribute.

Value	Attribute	Impact	Degree of consequence
Hanseatic Heritage	Existing buildings (tangible)	“Degraded”	Large negative consequence (3-)
	Archaeological deposits (tangible)		

Avoid

- Local infiltration measures should be established in the construction phase to maintain groundwater levels and pore pressure, particularly in the Finnegården area.

- Excavation in wet trenches and the use of prefabricated structures during the relocation of infrastructure or water and wastewater (VA) systems

Minimize

- The tunnel will be constructed to meet stringent waterproofing requirements, with no allowable leakage (required limit of less than 1 litre per minute per 100 meters) along the initial section of the tunnel. Such low leakage requirements are not directly observable and must therefore be monitored using pore pressure sensors and monitoring wells installed in proximity to the tunnel alignment. The required level of watertightness is to be achieved through pre-grouting, whereby the rock mass is injected with cement-based grout prior to excavation in order to seal potential water pathways in the surrounding bedrock.
- The foundations of the lighting masts must be adapted to the planned underground infrastructure.

Reduce

- Should the tunnel not meet the required sealing requirements, additional mitigation measures may be necessary. These may include groundwater infiltration—primarily as a temporary measure—and the installation of a waterproof, undrained lining of the tunnel profile.

Attribute - The old wharf and 62 buildings of former township

The impact is assessed based on traffic changes, changes in use and functions, public transportation, lighting and upgrading of the public space. The various measures planned has the potential of affecting the OUV. The impact on the attribute is “somewhat degraded” which gives a medium negative consequence (2-).

Table 5-2: Assessed consequence on attribute.

Value	Attribute	Impact	Degree of consequence
Contemporary urban cityscape	The old wharf and 62 buildings of former township (tangible)	“ Somewhat degraded ”, in the lower end of the scale	Medium negative consequence (2-)

Avoid

- The detailed zoning plan for the main cycle route Torget–Skuteviken, as currently proposed, does not provide a coherent cycling solution through the city centre and lacks connectivity between Rasmus Meyers Allé and Småstrandgaten. It is argued that in this area conditions are sufficiently legible to allow cyclists to disperse across adjacent areas before rejoining designated cycling infrastructure from Småstrandgaten towards Sandviken. A similar approach could be applied along Bryggen, which would be more compatible with the highly sensitive cultural environment and aligned with recommendations from previous planning phases. The introduction of bidirectional cycle lanes along Bryggen creates a functional barrier and weakens the relationship between Vågen and the Bryggen buildings. Removing the cycle lanes in front of Bryggen would reduce the traffic footprint and reduce this barrier effect. The area is spacious and legible, allowing cyclists to navigate the quay area at reduced speeds or the road, which would improve conditions for visitors and pedestrians while maintaining clarity in the allocation of space for public transport. It is therefore recommended to either establish a shared traffic area for buses and cyclists, or to terminate the cycle lanes at Murbryggen and resume them from Dreggsallmenningen.

Rectify

- Replacement of trench materials around existing infrastructure may be considered if improved technical solutions are available to prevent groundwater transport (this is already done at Finnegården)

Attribute - The objective of conserving Bryggen

Impact assessed because the proposed action can reduce groundwater level. Mainly because of uncertainty in the hydrogeological calculations. The impact on the attribute is “somewhat degraded” which gives a medium negative consequence (2-).

Table 5-3: Assessed consequence on attribute.

Value	Attribute	Impact	Degree of consequence
Contemporary urban cityscape	The objective of conserving Bryggen (intangible)	“Somewhat degraded”	Medium negative consequence (2-)

As the groundwater changes is the reason for the impact assessment, reference is made to the mitigation measures proposed under the attribute Existing buildings and Archaeological deposits.

Supporting attribute - Compact medieval urban structures

Impact assessed based on Rail alignment and portal in Heggebakken, cycle route and public transport corridor and changes in traffic. The impact on the attribute is “degraded” which gives a large negative consequence (3-).

Table 5-4: Assessed consequence on attribute.

Value	Supporting attribute	Impact	Degree of consequence
Historic townscape and historic trading port	Compact medieval urban structures (tangible)	“Degraded” , towards somewhat degraded	Large negative consequence (3-)

Avoid

- Where lighting masts are proposed in Småstrandgaten, in the vicinity of the Old Town Hall, due consideration must be given to key sight lines and the cultural environment. In particular, the Old Town Hall functions as an important visual focal point and should be safeguarded accordingly.

Supporting attribute - Historic harbour district

Impact assessed based on public transport corridor and bidirectional cycle lanes. The impact on the attribute is “somewhat degraded” which gives a medium negative consequence (2-).

Table 5-5: Assessed consequence on attribute.

Value	Supporting attribute	Impact	Degree of consequence
Historic townscape and historic trading port	Historic harbour district (tangible)	“Somewhat degraded”	Medium negative consequence (2-)

Avoid

- To reduce barrier effects, increased public space should be provided in front of the Hanseatic Museum. This need has been consistently raised during stakeholder engagement processes in both

previous and current HIA/KUVA processes. The area in front of Finnegården, within the World Heritage property, should prioritise interpretation and visitor experience.

- Further reduction of kerb heights should be considered to create a more continuous public realm surface and minimise barrier effects associated with the traffic area.

Supporting attribute - Archaeological deposits (outside of the World Heritage property)

Impact assessed based on Light rail alignment, water/wastewater infrastructure, traffic corridor upgrading, hydrogeological changes and traffic. The impact on the attribute is “degraded” which gives a large negative consequence (3-).

Table 5-6: Assessed consequence on attribute.

Value	Supporting attribute	Impact	Degree of consequence
Historic townscape and historic trading port	Archaeological deposits (tangible)	“Degraded”	Large negative consequence (3-)

Avoid

- Lower Torgallmenning and Torget: In order to safeguard surrounding archaeological deposits, both within and outside the plan area, as well as buildings founded on organic layers, permanent changes to groundwater levels and pore pressure in the ground must be avoided.
Mitigation measures—such as excavation in wet sections, the use of prefabricated structures, and the limited pumping of groundwater within open trenches for the connection of structures, pipes, and manholes—may be required and will need to be addressed during detailed design.
In accordance with the planning provisions, any excavation works must be supported by an approved plan for preventing permanent groundwater drawdown, subject to approval by the relevant cultural heritage authorities. The developer must also document that the proposed measures do not increase the risk of settlement.
Risk-reducing measures will include monitoring of pore pressure and groundwater levels before, during, and after the construction phase. In addition, infiltration solutions must be prepared and implemented where necessary if pore pressure decreases during excavation.
During the operational phase, groundwater conditions are expected to stabilise at pre-construction levels. This will be ensured through the use of low-permeability materials around new infrastructure below the groundwater table.
The measure can thereby be implemented in a manner that safeguards surrounding archaeological deposits both within and beyond the plan area.
- Heggebakken: Extensive interventions in organic archaeological deposits and excavation into bedrock may affect groundwater conditions. Changes in groundwater levels—resulting from the removal of organic layers or from new underground cavities reducing groundwater recharge from the hillside—may impact archaeological deposits over a wider area. This is particularly relevant westwards towards Vågsbunnen, where organic cultural layers are increasingly dependent on stable groundwater levels. For the construction pit, tunnel portal, and the tunnel itself, as with other subsurface interventions, a plan must be in place to prevent groundwater drawdown, in accordance with the provisions of the plan. For the tunnel portal at Heggebakken, a watertight sheet-pile structure and vertical cut-off wall will be established, and infiltration wells during the construction phase will be installed in the surrounding area.

Minimize

- If existing pipes are removed, surrounding materials must be sealed with impermeable materials to prevent groundwater flow.
- If existing pipes are decommissioned but retained in situ, both the pipes and surrounding materials must be sealed to prevent groundwater transport.
- Existing construction pits should be reused to avoid creating additional conflicts.

Supporting attribute - Historic wooden city

Impact assessed based on light rail alignment, tunnel portal and traffic change. The impact on the attribute is “degraded” which gives a medium negative consequence (2-).

Table 5-7: Assessed consequence on attribute.

Value	Supporting attribute	Impact	Degree of consequence
Contemporary urban cityscape	Historic Wooden city (tangible)	“Degraded”, in the lower end of the scale	Medium negative consequence (2-)

Avoid

- To avoid conflicts with the historic wooden buildings in Rosegrenden, the solution should be designed to eliminate direct impacts on the buildings. This may be achieved by reducing the width of pedestrian or carriageway sections over a limited distance.

5.2 Operational phase

All matters related to automatically protected cultural monuments must be clarified in an operational phase. As a mitigating measure, there will be requirements for monitoring groundwater conditions in pre-Reformation cultural layers and how this is changed in order to be able to consider various measures to improve the situation. An environmental monitoring system has already been established that will be used for this purpose.

6 Conclusion

Background

The City of Bergen has prepared a detailed zoning plan for the Light Rail (Bybanen) section Kaigaten–Sandviken. The proposal entails placing the light rail in a tunnel, in contrast to the currently approved solution, which routes the light rail across Torget and along Bryggen.

At the same time, a plan is being prepared for a main cycling route connecting the city centre with the cycle network towards Åsane. Although these are two separate zoning plans, they are assessed as a whole with regard to impacts on the World Heritage property Bryggen.

Contractual information and acknowledgements

This report has been prepared by Norconsult. The lead specialist is Eirik Herdlevær. The report has been partially prepared and quality-assured by Ole-Magne Nøttveit and Siri Sandtorv Heimark. All authors are employed by Norconsult.

The report has been prepared on behalf of the City of Bergen, with Norconsult under contract for the work. It is confirmed that the report has been prepared independently and without influence from other work within Norconsult.

Values

The assessment is based on Method M-1941, with methodological adaptations. Values are generally high, reflecting the principle in M-1941 that World Heritage properties are assigned very high value. The assessment distinguishes between:

- Attributes of the World Heritage property itself, and
- Supporting attributes, referring to cultural heritage elements and environments linked to Hanseatic activity.

Elements associated with this activity are assessed as having very high value, independent of their relation to the World Heritage property. The historic wooden building environment within the study area is assessed as having high, to very high value.

Impact and consequence

The combined cycle and light rail plans are assessed as having a **large negativ consequence**. Certain impacts—such as conflicts with medieval archaeological deposits and the medieval masonry structure in Kong Oscars gate and Heggebakken—are difficult to avoid given the planned rail alignment and required infrastructure works. The remaining key conflicts can be summarised as:

- Groundwater conditions
- Minor functional barrier effects from the addition of bidirectional cycle lanes
- Reduced area around entrance to Finnegården
- Loss of valuable wooden buildings in Sandviken

Ground water conditions

A groundwater model has been developed based on both existing and new borehole data. This provides a significantly improved knowledge base compared to earlier assessments. The model indicates a potential groundwater drawdown of up to 10 cm at Bryggen and 5 cm at Finnegården. Groundwater reductions of up to 5 cm are indicated for Vågsbunnen (RA-B-017) given the water ingress requirements referred to above. It should be noted that these changes reflect variations in the average groundwater level over time, whereas

observed natural groundwater level fluctuations are considerably greater. As a result, demonstrating whether the tunnel has caused groundwater lowering of this magnitude would be both challenging and time-consuming. It is some uncertainty around the calculations at this point in the process. This contributes to the consequence assessed. Possible impact from ground water fluctuations must be followed up in the later phases of the project.

Functional barrier effects

The addition of bidirectional cycle lanes creates a minor functional barrier along Bryggen, consisting of a total of four traffic elements including the road for public transport and delivery. While the proposal narrows the overall traffic area, it also introduces a new high-speed cycling element. Kerb heights, although reduced compared to today, reinforce the barrier effect. Visitors must cross multiple traffic streams, reducing accessibility along the quay.

Distance to Finnegården

The new traffic layout moves closer to Finnegården, weakening the spatial relationship with Vågen and reducing available space for visitors and pedestrians. This is assessed as a negative impact and has been a key concern in previous planning phases.

Relocation of valuable wooden buildings in Sandviken

The proposed alignment affects three buildings within Rosegrenden, which are at risk of demolition. As mitigation, relocation within the same area is proposed. The wooden building environment in Bergen forms an important supporting value for the World Heritage property. Even with relocation, the intervention alters the integrity of the environment.

Methodological discussion

Heritage Impact Assessments (KUVA/HIA) is a relatively new method for assessing world heritage in Norway and require adaptation to specific contexts. Definitions of values, attributes, and supporting values vary across World Heritage sites.

In this assessment, a methodological challenge arises from the concept of “supporting attributes”. These are defined in the management plan, as elements outside the World Heritage property. In other world heritage contexts, such elements are typically referred to as supporting values or associated values. For comparison, in the Rjukan–Notodden industrial heritage site, supporting values are linked to attributes and include physical traces such as former railway infrastructure. These elements have limited value in isolation but high value in context.

At Bryggen, the “supporting attributes” often have very high intrinsic value independently, which blurs the distinction between core attributes and surrounding heritage. This creates methodological challenges and complicates the interpretation of impacts on the World Heritage property.

This issue cannot fully be avoided in a historic urban context like a medieval city, but it can be mitigated by:

- Clearly distinguish OUV-carrying attributes from contextual/supporting environments
- Introducing a two-tier evaluation
- Explicitly weighting impacts on in-property versus out-of-property

As this is a supplementary assessment, the development of specific solutions to address this issue has not been within the scope of the study.

Positive effects from the proposal

There are several positive aspects associated with the proposed development. The proposal includes a comprehensive upgrade of the public space, which, particularly along Vågen, provides an opportunity to

better reveal and communicate historic relationships and urban patterns through the design of the streetscape in a way that is not currently achieved.

The upgrading of water and wastewater infrastructure, together with other underground utilities, is identified as a positive measure in Bryggen's Management Plan and is generally regarded as beneficial. Such upgrades may also improve surface water management, reducing the infiltration of salts and pollutants from the urban environment into the groundwater system by directing runoff away from sensitive areas.

The City Centre Traffic Plan, which forms part of the baseline scenario, will result in a substantial reduction in traffic volumes. While the additional benefits of the proposed development are less pronounced when assessed against this reference scenario, the overall trend remains positive.

A more coherent streetscape design along Bryggen will create additional space between the traffic corridor and the historic wharf buildings. Combined with lower kerb heights than those anticipated in the reference scenario, this will contribute to a more integrated and visually coherent environment. The proposal will also remove the existing bus shelters, bus stops, and taxi stands along Bryggen, thereby increasing the space available for visitors and pedestrians. Furthermore, architectural lighting of the World Heritage property will enhance the visibility of the historic buildings and provide an improved visual experience during evening and night-time hours.

Possible impact on OUV

The HIA/KUVA evaluates the potential impacts and resulting consequences for a total of eight attributes and supporting attributes, with the corresponding OUV values indicated in bold:

- **Hanseatic Heritage**
 - Existing buildings
 - Archaeological deposits
- **Historic townscape and historic trading port**
 - Compact medieval structures (supporting attribute)
 - Historic harbour district (supporting attribute)
 - Archaeological deposits (supporting attribute)
- **Contemporary urban cityscape**
 - The old wharf and 62 buildings of former township
 - Historic wooden city (supporting attribute)
 - The objective of conserving Bryggen

Hanseatic Heritage (OUV)

Impacts have been assessed for two attributes, *Existing Buildings* and *Archaeological Deposits*. As these attributes are closely interconnected, they have been assessed collectively.

According to the assessment methodology, uncertainty regarding the groundwater conditions resulting from the proposed development leads to a rating of high impact. The groundwater model itself predicts only limited changes in groundwater levels. However, uncertainty associated with the modelling results increases the assessed level of impact and, consequently, the significance of effects.

The proposed development therefore has the potential to affect the Outstanding Universal Value (OUV) of the World Heritage property. Further work should focus on strengthening confidence in the groundwater modelling results and reducing the remaining uncertainties. Achieving this would provide a stronger basis for demonstrating that the proposed development does not pose a risk to the OUV of Bryggen, particularly its Hanseatic heritage values.

Historic townscape and historic trading port (OUV)

The Hanseatic activity is also reflected in a range of associated heritage assets, including the medieval town of Bergen (*Archaeological Deposits*) located outside the boundaries of the World Heritage property. The proposed development will conflict with medieval cultural deposits because of infrastructure works and potential hydrogeological changes. Several of the streets affected by the proposed development have

previously been subject to infrastructure works associated with earlier projects. The deepest archaeological deposits will therefore be avoided. At the same time, the reduction in traffic volumes is expected to result in certain beneficial effects and relieve pressure on cultural layers.

Throughout the city, numerous medieval structures and spatial relationships contribute to the supporting attribute *Compact Medieval Structures*. Only a limited number of these resources will be affected. However, a historic masonry structure in Heggebakken will be directly impacted, and the proposed development may also conflict with currently unidentified medieval structures.

The *Historic Harbour District* is located in the immediate setting of the World Heritage property. The proposed road infrastructure will be positioned somewhat closer to Finnegården than in the reference scenario, which is considered an adverse change from the perspective of the World Heritage property.

Overall, the impacts on the supporting attributes are not considered sufficient to threaten the Outstanding Universal Value (OUV) of Bryggen, in particular its *Historic Townscape and Historic Trading Port* values. Nevertheless, the proposed development represents a negative trend that, over time, could contribute to urban development that is less consistent with and supportive of the OUV of Bryggen.

Contemporary urban cityscape (OUV)

As with the OUV value *Hanseatic Heritage*, uncertainty regarding potential groundwater impacts may also affect the OUV value *The Objective of Conserving Bryggen*. Further investigations and/or refinements of the groundwater model are therefore required to establish a more robust evidence base regarding groundwater conditions. The predicted groundwater impacts are, in principle, limited; however, the uncertainty associated with these predictions results in a more precautionary assessment under the methodology applied. This issue should be addressed as part of the subsequent stages of project development.

The Wooden Town of Bergen forms part of the supporting attributes of the World Heritage property. Three buildings in Rosegrenden will be affected by the proposed development and will need to be relocated. The current proposal is to relocate these buildings within Rosegrenden itself. This has been assessed as not affecting the OUV.

The road infrastructure will be positioned closer to Finnegården than in the reference scenario, which may affect the attribute *Use and Functions* by reducing the amount of space available for visitors and interpretation activities in this area. This change is not considered to adversely affect the OUV; however, it represents a negative development in the setting and management context of the World Heritage property.

Mitigation measures

Reference is made to Chapter 5 for a full overview of mitigation measures. To avoid impacts, the scope of the project should be adjusted to better accommodate the wooden building environment in Sandviken as a supporting value, as well as the environment in front of Bryggen and Finnegården. To minimise impacts, due consideration must be given to medieval archaeological deposits when relocating underground infrastructure. Measures should also be implemented to ensure groundwater infiltration, and existing groundwater management systems should be maintained.

Kerb heights should be further reduced to minimise barrier effects, and a plan should be secured for a comprehensive upgrade of the public realm in order to reduce uncertainty associated with this aspect of the project. To rectify existing conditions, the replacement of trench materials around existing infrastructure should be considered, provided that improved technical solutions are available and that such measures do not result in damage to archaeological deposits.

Ongoing process

This is not a final report. Throughout the life of the project, continuous effort will be required to understand, assess, and manage the potential impacts of the proposed development on the Bryggen World Heritage property. The issues and concerns identified in this report should be addressed and further developed

throughout the subsequent planning and design phases, up to and including any eventual implementation of the proposed development.

Following the public consultation phase and any subsequent political decision on the proposal, it will likely be necessary to review and update the assessment. This review should consider whether consultation responses, modifications to the project design, updated technical documentation, or conditions attached to any approval affect the conclusions of the HIA/KUVA, including the assessment of potential impacts on the Outstanding Universal Value (OUV) of Bryggen.

The conservation and management of the World Heritage property should therefore be regarded as an ongoing process throughout the project lifecycle, whereby new knowledge and any changes to the proposed development are continuously incorporated into the assessment process to ensure that the OUV of Bryggen is safeguarded appropriately.

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